Lake St. Clair Regional Monitoring Project

Inland Lake Sediment Sampling and Analysis Report

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January 2005

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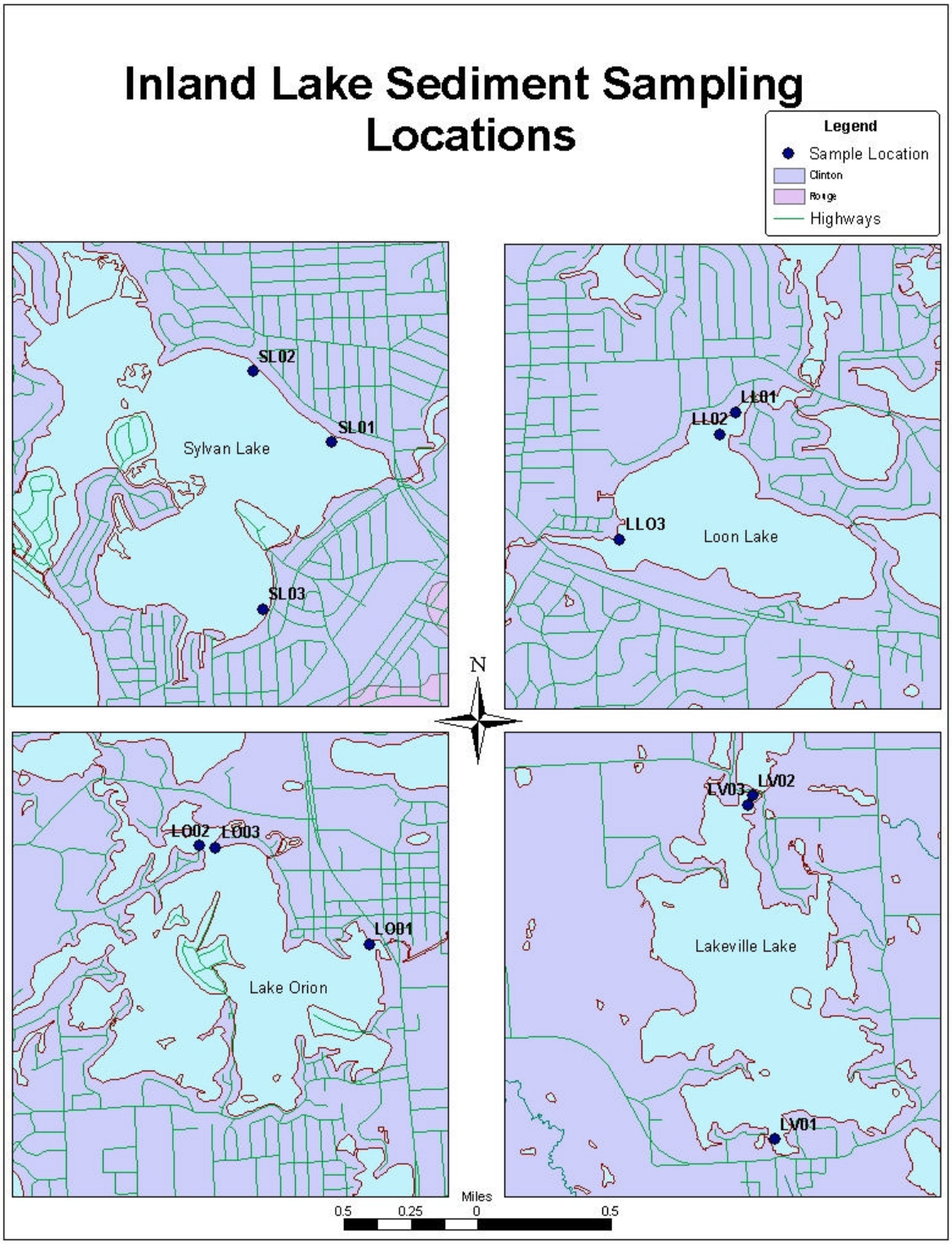
1.0 PROBLEM DEFINITION AND BACKGROUND

In response to water quality concerns and the recommendations listed in the Remedial Action Plans for the Clinton River and St. Clair River AOCs, and the Blue Ribbon Commission Report, Macomb County, Oakland County, and St. Clair County have constructed a work plan to develop a comprehensive assessment of water quality of the Lake St. Clair, St. Clair River and Clinton River Watersheds. The current project is part of a three-year comprehensive water quality monitoring effort to be conducted in Lake St. Clair, the Clinton River Watershed, and the St. Clair River Watershed (Belle, Black, and Pine River Watersheds). It incorporates the Macomb County Health Department's ongoing Lake St. Clair Assessment Project.

The overall goal of this sampling effort is to provide a baseline sediment quality evaluation for the selected inland lakes located in Oakland County (Figure 1). These four lakes are located in the headwaters of the Clinton River watershed, a major contributor to the pollution problems that have plagued Lake St. Clair. This effort comprises a small component of the larger Lake St. Clair Regional Water Quality Monitoring Project.

The Clinton River watershed consists of 760 square miles of industrial, urban, suburban and agricultural land, primarily in Oakland and Macomb Counties. Following the completion of the Clinton River Remedial Action Plan in 1988, the entire Clinton River watershed was included as an Area of Concern. According to the Clinton River Watershed Remedial and Preventive Action Plan Update (1998), the single greatest source of water quality problems in the Clinton River watershed and Lake St. Clair is storm water runoff and its associated pollutants.


Inland Lake Sediment Sampling Locations
Legend
Sample Location
Clinton
Rouge
Highways
SL02
SL01
Sylvan Lake
SL03
LL01
LL02
LLO3
Loon Lake
N
LO02
LO03
LO01
Lake Orion
LV03
LV02
Lakeville Lake
LV01
Miles
0.5
0.25
0
0.5

1.1 Task Description

Sediment samples were collected in sediment deposition zones in selected inland lakes in Oakland County (Table 1). These areas were selected based on known outfall locations, inlet/outlet locations, and accessibility. Core samples were collected using a Vibrocore sampler at 12 locations (3 in each lake) in accordance with the Quality Assurance Project Plan (QAPP) and Standard Operating Procedures (SOPs).

Table 1. Inland Lake Sampling Locations

Designation	Sample ID	Location	Date
IL01	LV	Lakeville Lake	January 22, 2004
IL02	LO	Lake Orion	December 22, 2003
IL03	LL	Loon Lake	December 15, 2003
IL04	SL	Sylvan Lake	December 13, 2003

2.0 SAMPLING METHODS

2.1 Core Sampling

Sediment samples were collected using a stainless steel Ogeechee™ Sand Corer with two-inch plastic CAB (cellulose acetate butyrate) core liners. The nose of the corer was slowly lowered into the water at each location and was then pushed into the sediment bottom using the hand-held Vibracore unit. Once the operator could no longer advance the core, the core was sealed at the top to maximize sample recovery, and the core was retrieved. Each core liner was capped at both ends to contain the core and eliminate contamination of the sample. A minimum of three cores were collected from each sample location. Based on visual estimates of the core samples, additional cores were collected until the total volume of sediment samples was sufficient for compositing and analysis.

Due to freezing weather, the sealed liners were taken to ECT's storage garage in Brighton for processing. Cores from their respective sample locations were composited using a stainless steel bowl and a stainless steel spoon. In areas where multiple layers of sedimentation were evident, each layer was composited separately. The sample material was then transferred by way of the stainless steel spoon to clean pre-labeled containers provided by the laboratory. The containers were filled to about 90% to allow additional homogenization at the laboratory, then placed in a cooler on ice for eventual transport to the laboratory. For each subsequent sample, the stainless steel bowl and utensils were cleaned and rinsed with nonionic detergent solution, deionized water, and site water prior to sampling at the new location.

The composite samples were delivered under chain-of-custody to the laboratory for analysis. Analysis of the sediment samples included chemical oxygen demand (COD), total organic carbon (TOC), oil and grease (FOG-HEM), total

petroleum hydrocarbons (TPH), total Kjeldahl nitrogen, total phosphorus, ammonia-nitrogen, polychlorinated biphenyls (PCB), polynuclear aromatic hydrocarbons (PAH), pesticides, and metals.

2.2 Ponar Sampling

Because of the large sediment volume required for toxicity analysis, additional surface sediment samples were collected using a stainless steel ponar dredge. Several ponar samples were collected from each location until a sufficient volume was collected for subsequent analysis. Debris (such as rocks and plant material) occasionally interfered with the operation of the ponar, either causing the ponar to trigger early or inhibiting the device from completely closing. This is considered normal when using a ponar. The field notes reflect the number of times the ponar was deployed for each sample.

A subcontracted laboratory (RTI Laboratories, Inc., Livonia, Michigan) analyzed sediment samples for the parameters listed in Table 2.

After review of the chemical analytical results, the ponar samples from two locations on Lakeville Lake and two locations from Sylvan Lake were delivered to ASci Corporation, Environmental Testing Laboratory (Duluth, MN) for whole sediment toxicity analysis. The results from the other analytical parameters for the other two lakes did not warrant performing the toxicity assays.

Table 2. Sediment Analytical Parameters

Parameter	Abbreviation	Method	Container, Preservation	Holding Time
Chemical Oxygen Demand	COD	410.1	8-oz glass, 4°C	28 days
Total Organic Carbon	TOC	Walkley-Black	8-oz glass, 4°C	28 days
Oil and Grease	OGR	9071	8-oz glass, 4°C	14 days
Total Petroleum Hydrocarbons	TPH	418.1	8-oz glass, 4°C	28 days
Total Kjeldahl Nitrogen as N	TKN	351.2	8-oz glass, 4°C	28 days
Total Phosphorus as P	PHOS_T	365.2	8-oz glass, 4°C	28 days
Ammonia as N	NH3	350.1	8-oz glass, 4°C	28 days
Polychlorinated biphenyls	PCB	8082	4-oz glass, 4°C	14 days
Polynuclear Aromatic Hydrocarbons	PAH	8270C	8-oz glass, 4°C	14 days
Pesticides	Individual compounds designated separately	8081	4-oz glass, 4°C	14 days
Metals (arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc)	Individual elements designated separately	6020, 7000A, 6010B	8-oz glass, 4°C	6 months
E. coli	ECOLI	9223	8-oz glass, Ambient	24 hours
Toxicity, whole sediment	TOX_W	*Hyalella azteca, Chironomus tentans*	2 liter plastic	

3.0 RESULTS

Laboratory results can be found in tabular form in Table 3a-d, which includes a table of results for each lake. The laboratory analytical reports and a summary of the results for duplicate samples are included in Appendix A.

Table 4 presents a comparison of a subset of the data to published sediment quality guidelines taken from three sources. For this comparison only those results that exceeded one or more of the sediment quality guidelines are presented.

The toxicity assay report from ASci Corporation, stated that "none of the ECT sediments (LV-01, LV-02, SL-02, and SL-03) caused statistically significant decreases in either organism survival or growth when compared to the West Bearskin reference control." The toxicity assay data are summarized in Table 5, and the ASci report is included in Appendix B.

Notes from the field personnel have been typed and can be found in Appendix C.

Highlights of the sediment sampling results can be summarized as follows:

- No PCBs were detected in any samples.
- No pesticides were detected in any samples.
- All three Loon Lake and two of the three Lakeville Lake sediment samples were highly enriched in organic matter.
- The results of the analysis of three duplicate sediment samples in some cases falls outside the acceptance criteria for relative percent difference of 20%.

4.0 DISCUSSION

The results of the sediment sampling of the inland lakes were compared to both the Environmental Protection Agency (EPA) Region 5 Resource Conservation and Recovery Act (RCRA) Ecological Screening Levels (ESL) and consensus-based Probable Effects Concentrations (PEC) developed by MacDonald, et al. (2000). Figure 2 presents a summary of the sediment results and compares them to the ESLs. Table 4 lists the highest concentrations detected for these compounds and the location from which the sample was taken.

The EPA ESLs are conservative screening criteria. If concentrations of constituents identified in sediments exceed these values, the constituents should be evaluated further. Conversely, if concentrations of constituents in sediment are below these values, then they are presumed to not present a potential ecological risk. The PEC values, in contrast, represent an upper bound on screening criteria. Constituent concentrations in sediment above these values are thought to likely have an adverse effect on potential ecological receptors and warrant further investigation. In instances where no ESL or PEC value has been derived, an Apparent Effect Threshold (AET) value (Buchman, 1999) was used to provide a point of comparison. The AET values were prepared specifically for sediments of Puget Sound, Washington, and are therefore not strictly applicable to the samples collected for this work.

The sediment results will also be compared with results reported in the 2002 Lake St. Clair Water Quality Assessment report published by the Macomb County Health Department. This report summarizes sediment quality as reflected in samples collected at locations within the Clinton River watershed and in near-shore areas of Lake St. Clair.

4.1 Lakeville Lake – IL01

On January 22, 2004, field crews mobilized to Lakeville Lake. Since the lake was completely covered with ice, mobilization at this time was made possible by employing the assistance of an airboat and operator. In order to collect samples, an auger was used to get through the ice. The sampling procedures described above were followed.

4.1.1 PAHs

In the sample from location LV01, near the lake outlet, five PAHs were detected, four of which (chrysene, fluoranthene, naphthalene and pyrene) were present at concentrations above the ESLs. However, none of these were above the PEC value.

4.1.2 Trace Metals

Several trace metals were present at elevated concentrations, particularly in the sample from LV02 and to a lesser extent at LV03. While the levels are elevated and in some cases exceed the ESL, the concentrations are in many cases comparable to the statewide default background soil values established by the Michigan Department of Environmental Quality. While this comparison of sediment concentrations with soils may not be strictly appropriate, it does provide an additional frame of reference for the trace metal concentrations observed.

4.1.3 Other Parameters

With the exception of *E. coli*, present at very low levels, many of the other parameters analyzed are elevated in samples LV02 and LV03, reflecting the very high organic matter content at these locations. The oil and grease concentrations, as high as 620 mg/kg, may be indicative of stormwater or other discharges and also include some naturally occurring constituents of the sediment organic matter.

4.1.4 Comparison with Other Sediment Assessment Results

The Macomb County Health Department prepared a comprehensive evaluation of the water quality of the Clinton River Watershed and its potential impact on Lake St. Clair (MCHD 2002). The PAH and oil and grease values found in Lakeville Lake are roughly the same order of magnitude of the values found in the Clinton River Watershed samples and near-shore samples collected from Lake St. Clair. Arsenic values, while generally on the same order of magnitude, were somewhat higher in Lakeville Lake than the nearshore Lake St. Clair sediment samples or the watershed sediment samples. Other trace metals were roughly comparable to the MCHD study results. COD, TOC, TKN and NH3 were generally elevated in Lakeville Lake relative to the Lake St. Clair results.

4.2 Lake Orion – IL02

On December 22, 2003, field crews mobilized to Lake Orion. The bays and coves of the lake were frozen and inaccessible for sampling. However, samples were collected at the opening of the inlet cove and at the outlet.

4.2.1 PAHs

No PAHs were detected in Lake Orion samples.

4.2.2 Trace Metals

No trace metals were detected at concentrations exceeding their respective ESLs.

4.2.3 Other Parameters

In contrast with the sediments from Lakeville Lake, Lake Orion sediments were very low in organic matter, the nutrient parameters, and oil and grease.

4.2.4 Comparison with Other Sediment Assessment Results

The Macomb County Health Department 2002 Lake St. Clair Assessment

identified trace levels of several pesticides, PCBs and PAHs, all of which were absent in the Lake Orion samples. Other parameters, including trace metals, nutrients and oil and grease, were generally lower than concentrations identified in the Lake St. Clair Assessment.

4.3 Loon Lake – IL03

On December 15, 2003, field crews mobilized to Loon Lake. The perimeter of the lake was frozen with approximately ½ - 2" of ice. All sample locations were accessible with the boat.

4.3.1 PAHs

No PAHs were detected in Loon Lake sediment samples. The practical quantitation limits were slightly elevated due to interference caused by the very high level of organic carbon in the samples.

4.3.2 Trace Metals

In the sample from LL01, arsenic was detected at a concentration of 14,100 µg/kg, exceeding the ESL of 9,790 µg/kg. Arsenic is well known to be present in unusually high concentrations in soils, groundwater and parent material in Oakland County and southeast Michigan in general, so concentrations in the 10,000-20,000 µg/kg range in uncontaminated soils are commonplace. Barium was detected in two samples exceeding the surrogate AET value of 48,000 µg/kg. However, barium in sediments is typically in the form of barium sulfate (barite) (Agency for Toxic Substances and Disease Registry [ATSDR] 1992). This form is extremely insoluble and essentially non-toxic to humans (ATSDR 1992). No other trace metals were detected at concentrations above the ESL.

4.3.3 Other Parameters

As was observed in the samples from Lakeville Lake, many of the other parameters analyzed (NH3-N, TKN, TOC, COD) are elevated in each of the Loon

Lake samples, reflecting the very high organic matter content at these locations. The oil and grease concentrations (hexane extractable material) were as high as 1,400 mg/kg, very likely including naturally occurring constituents of the sediment organic matter.

4.3.4 Comparison with Other Sediment Assessment Results

The Macomb County Health Department 2002 Lake St. Clair Assessment identified trace levels of several pesticides, PCBs and PAHs, all of which were absent in the Loon Lake samples. Arsenic was generally elevated in Loon Lake relative to the Lake St. Clair Assessment results. Other trace metal concentrations in Loon Lake sediments were generally lower than the sediments collected in the Lake St. Clair study. However, nutrients, TOC and COD were generally higher in Loon Lake sediments than those collected in the Lake St. Clair investigation.

4.4 Sylvan Lake – IL04

Field crews mobilized to Sylvan Lake on December 13, 2003. The lake surface in the vicinity of the boat launch was frozen to approximately 15 feet from shore. An alternative launch was located downstream of the lake.

4.4.1 PAHs

Ten PAHs were detected in the sample from SL03 at concentrations exceeding one or more of the sediment quality guidelines (Table 4). The source of these contaminants is likely a localized release of petroleum product such as diesel fuel, gasoline, or motor oil. Trace metals levels in the PAH-impacted sample are relatively low, arguing against used oil (which typically contains elevated metals levels) as a potential source.

4.4.2 Trace Metals

Several trace metals were present at elevated concentrations in the sample from

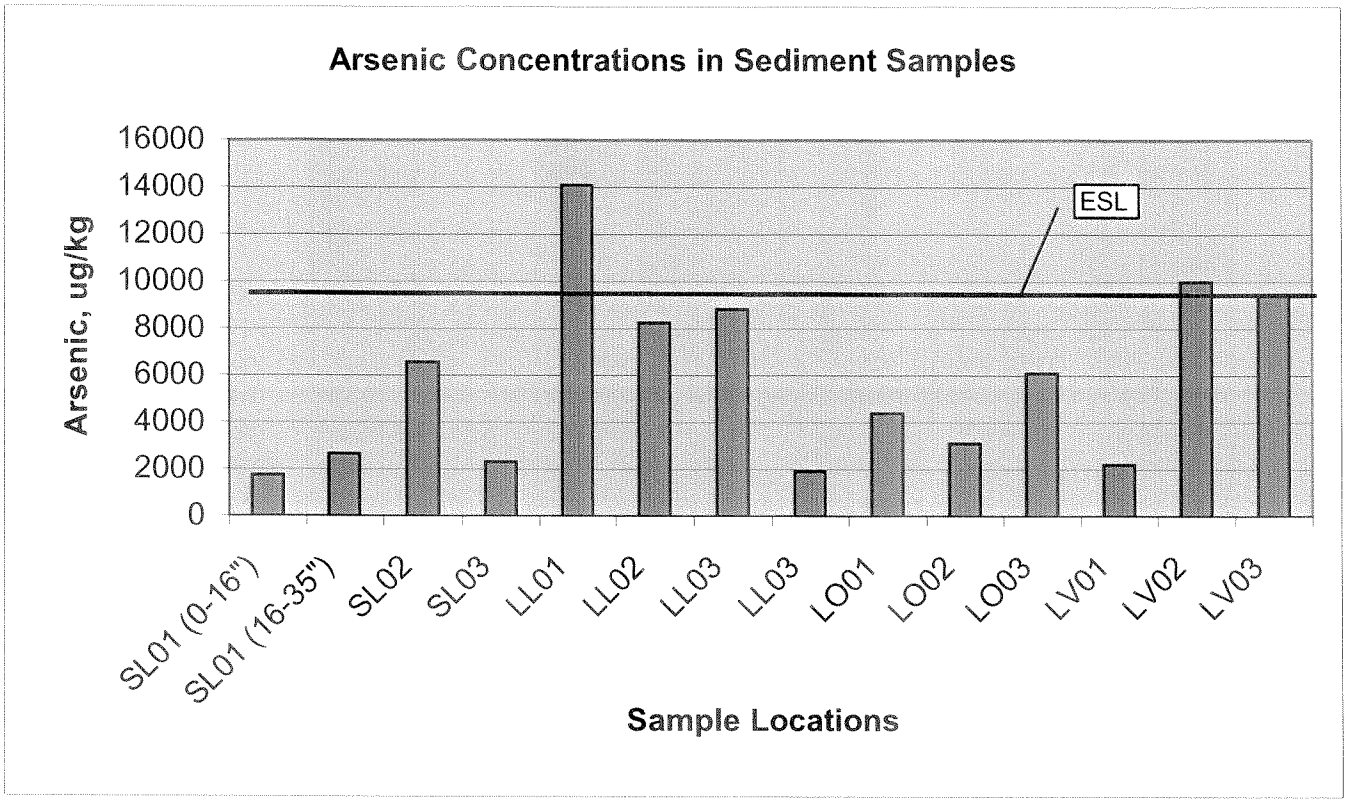
SL02 and to a lesser extent at SL03. While the levels are elevated and in some cases exceed the ESL, and PEC values, the concentrations are in many cases comparable to the statewide default background soil values established by the Michigan Department of Environmental Quality. While this comparison of sediment concentrations with soils may not be strictly appropriate, it does provide an additional frame of reference for the trace metal concentrations observed.

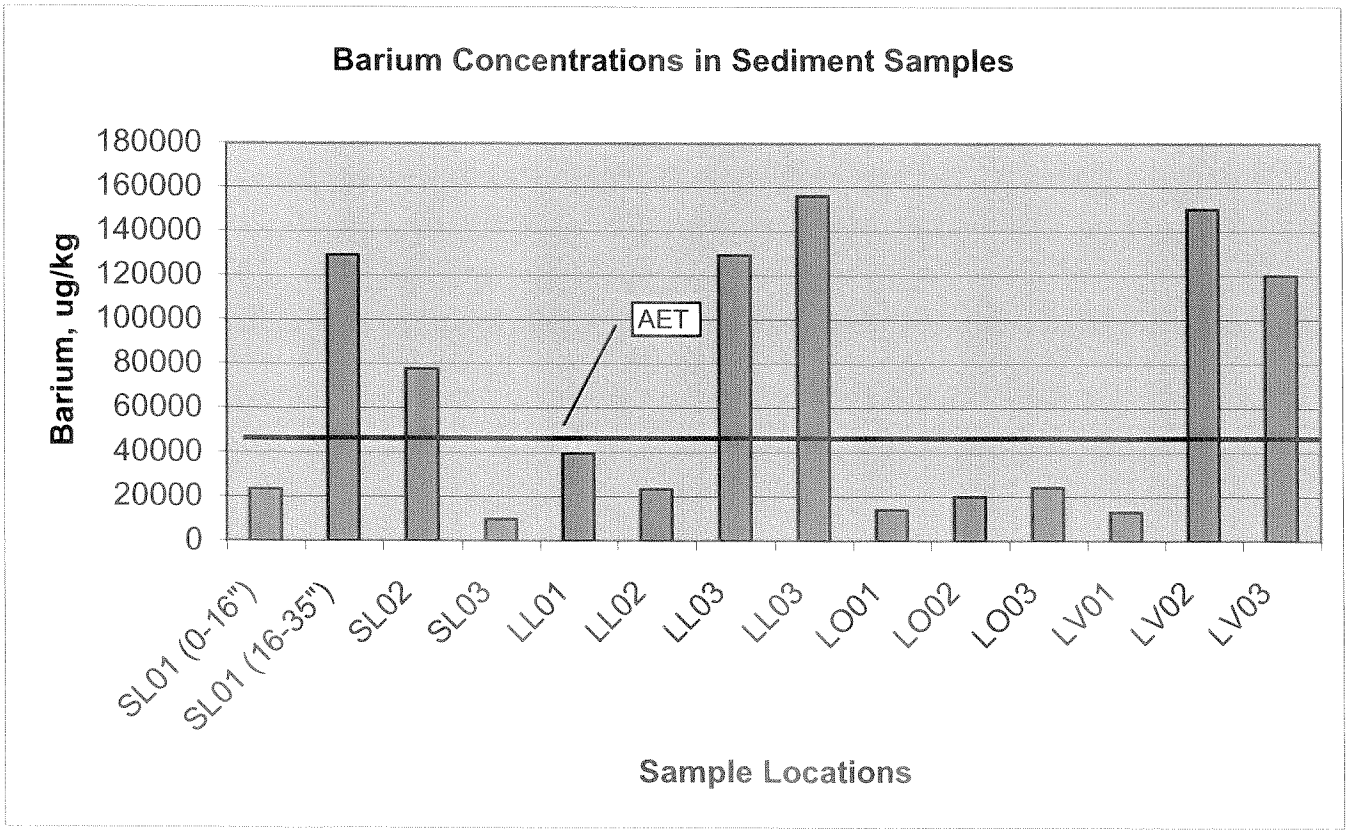
4.4.3 Other Parameters

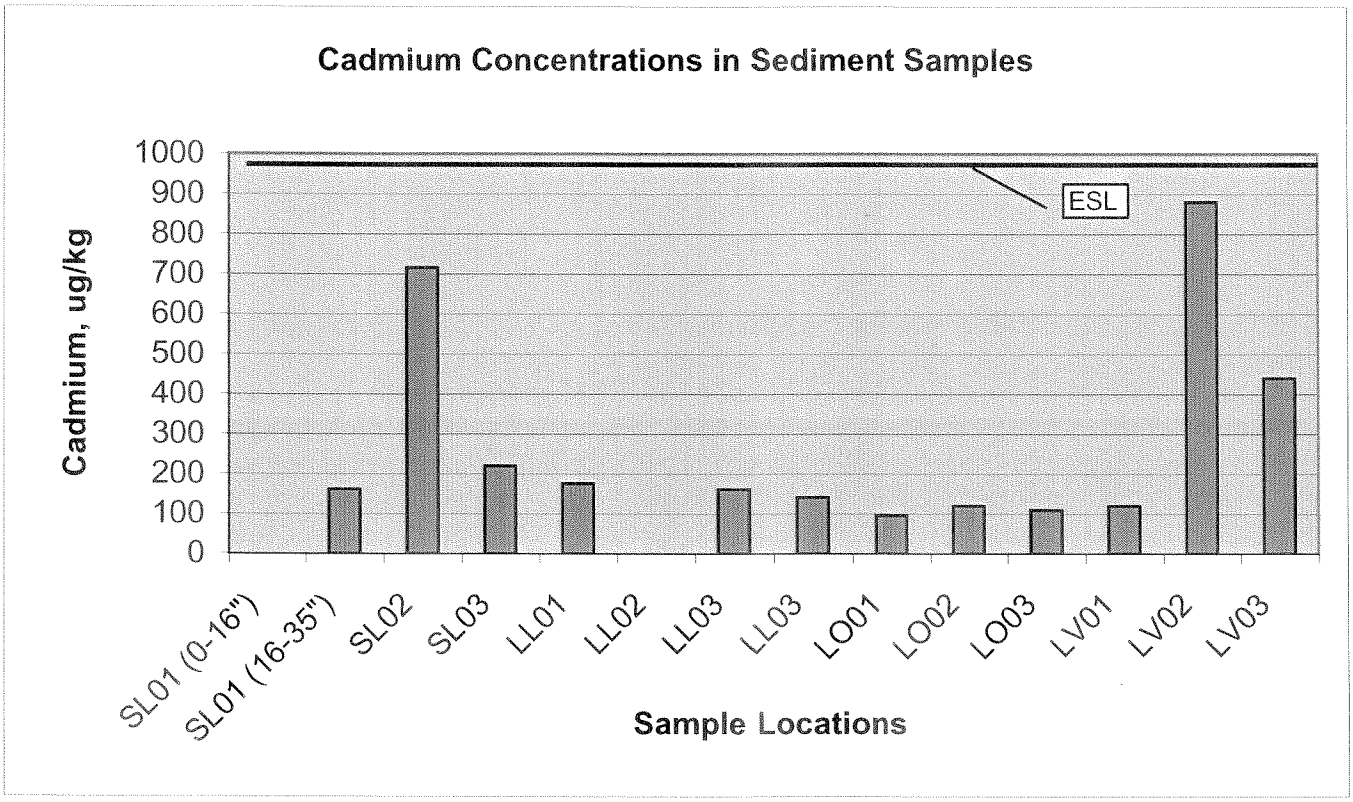
Most notable among the other parameters measured is the elevated oil and grease result (2,500 mg/kg) for the sample from SL02. This is a contradictory result in a sense, since it is in the sample from SL03 that the PAHs were detected, and thus where one might expect the oil and grease result to be high. As was mentioned earlier, the oil and grease method will include naturally occurring organic material, and the sample from SL02 is higher in TOC than the other Sylvan Lake samples. Nutrient data are roughly what would be expected based on the TOC content of the samples.

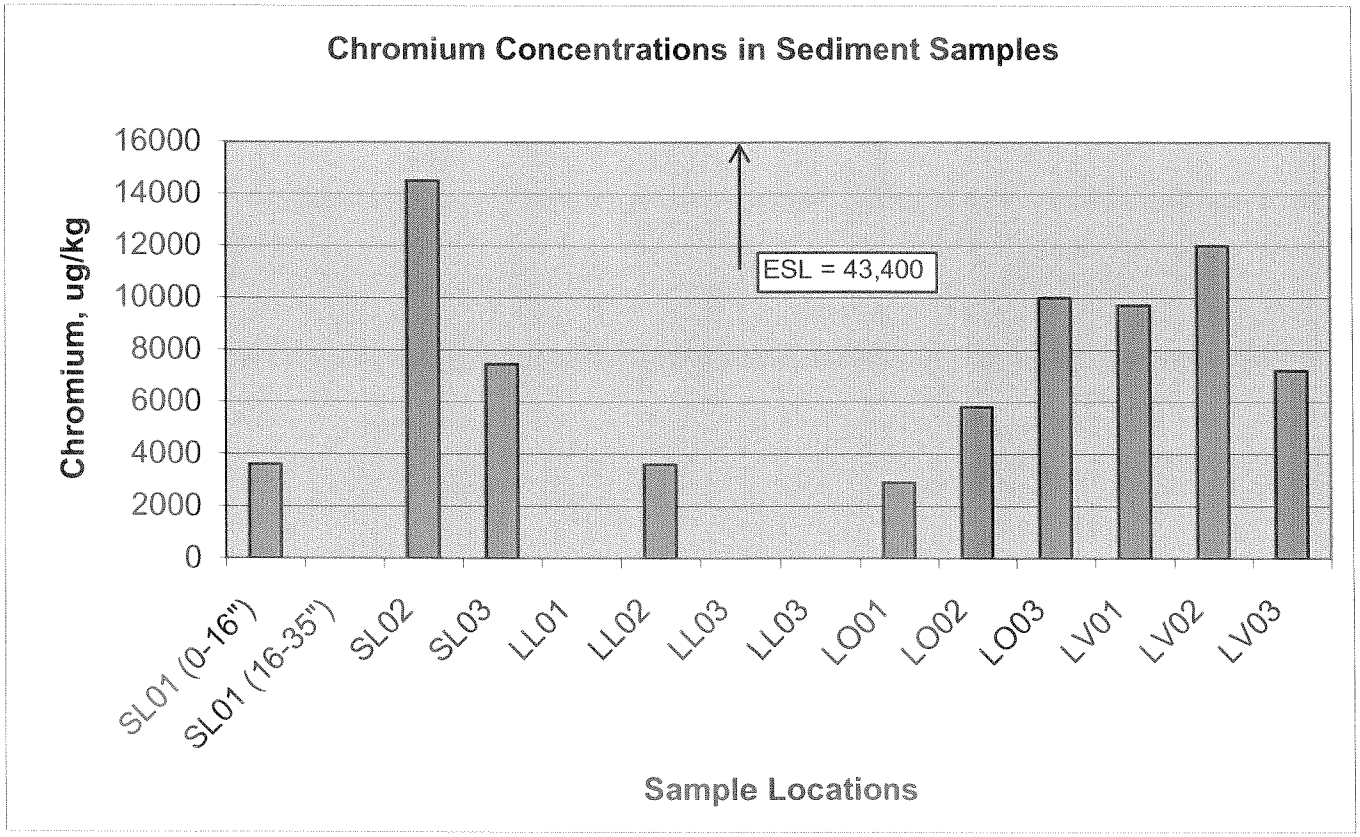
4.4.4 Comparison with Other Sediment Assessment Results

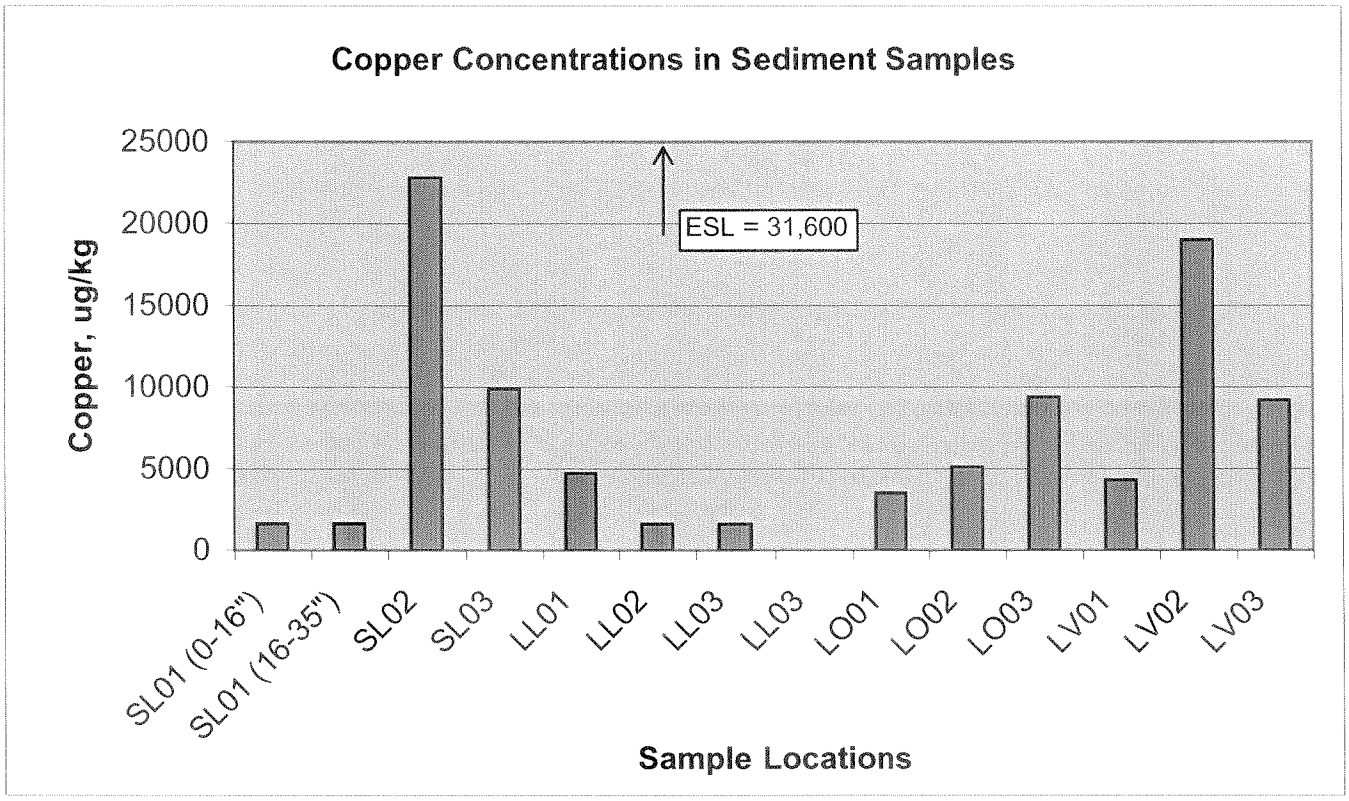
The PAHs identified in SL03 are similar both in terms of constituents identified and the levels at which they were measured to samples collected from near-shore areas of Lake St. Clair. Trace metals in Sylvan Lake are generally lower (with some exceptions) than samples collected during the Lake St. Clair study. In addition, other parameters, such as nutrients, COD and oil and grease were generally the same order of magnitude as in sediment samples from the Lake St. Clair study.

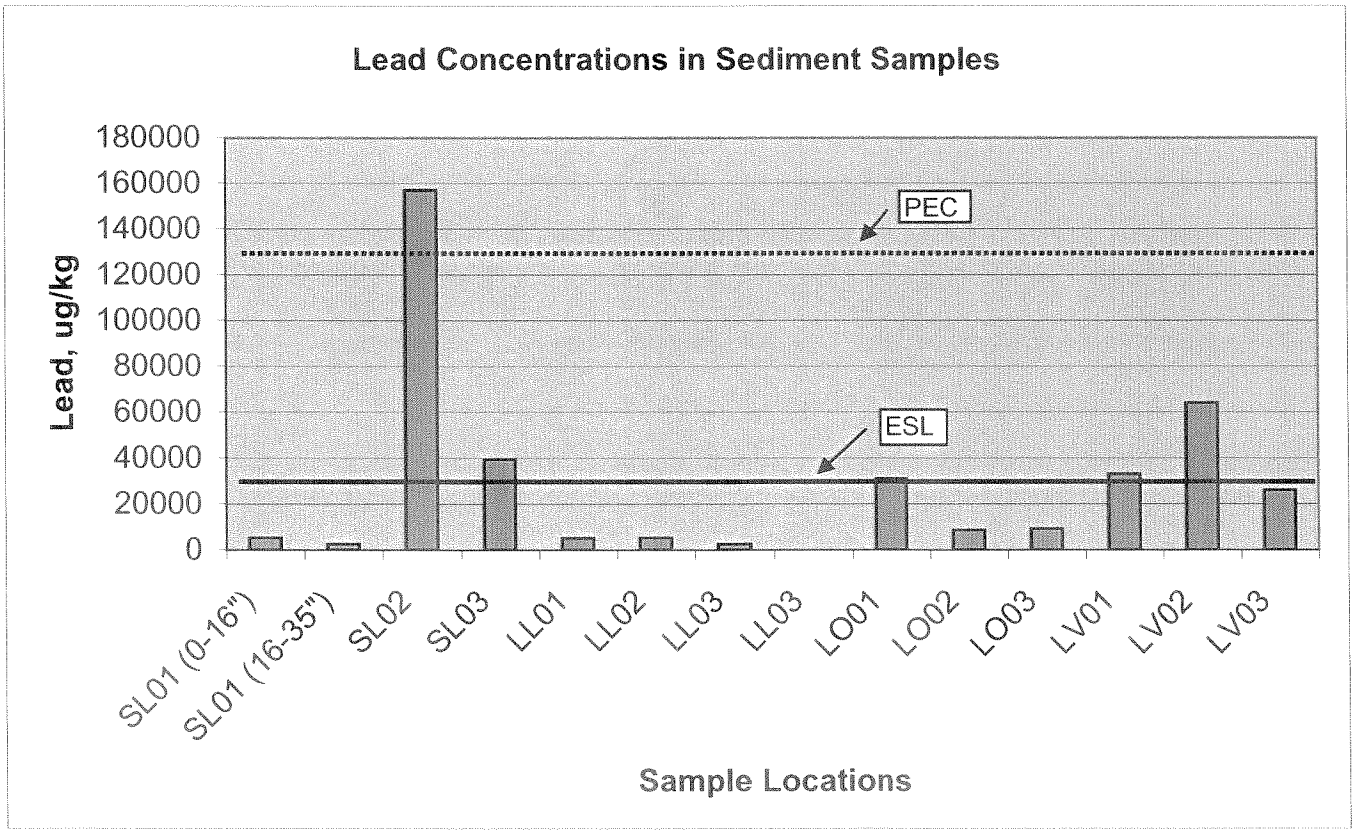

Arsenic Concentrations in Sediment Samples
Arsenic, ug/kg
16000
14000
12000
10000
8000
6000
4000
2000
0
ESL
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

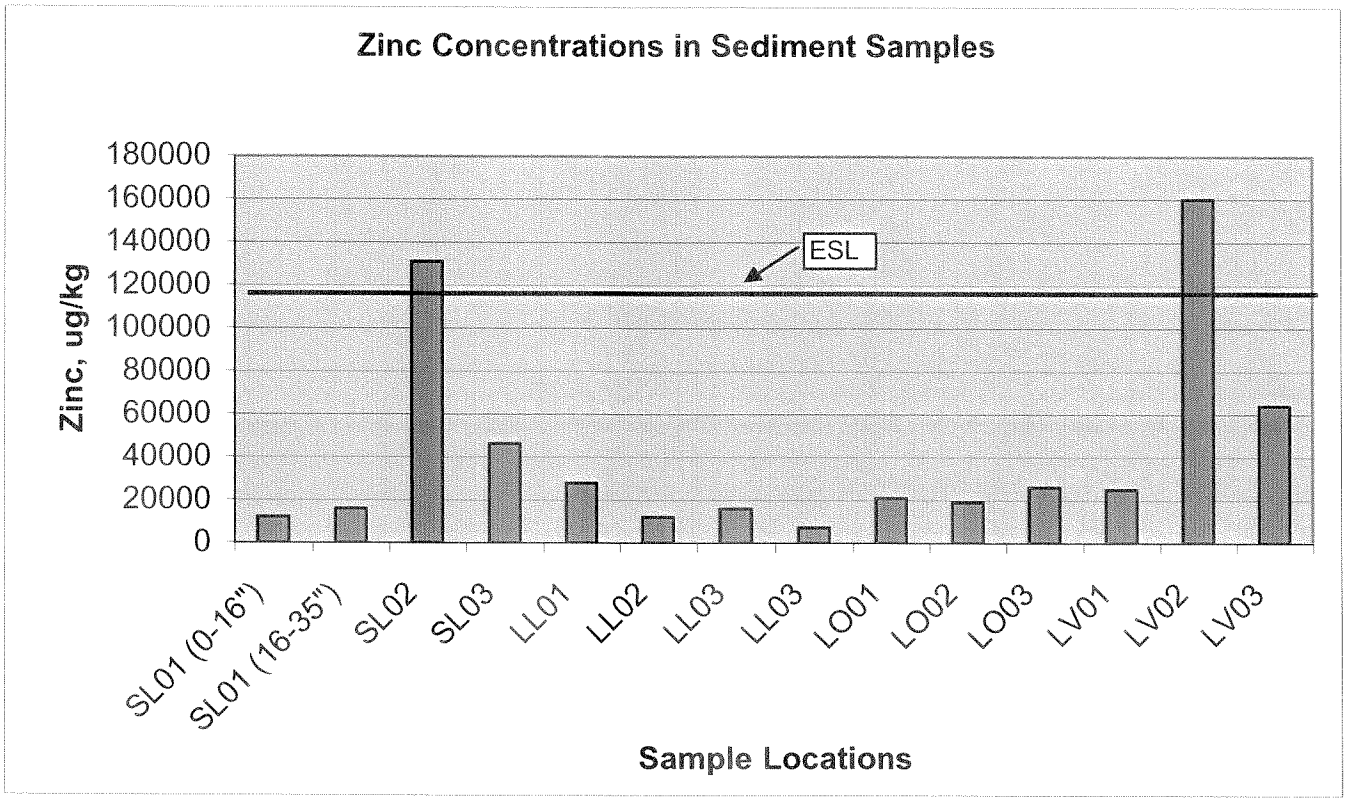

Barium Concentrations in Sediment Samples
Barium, ug/kg
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
AET
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

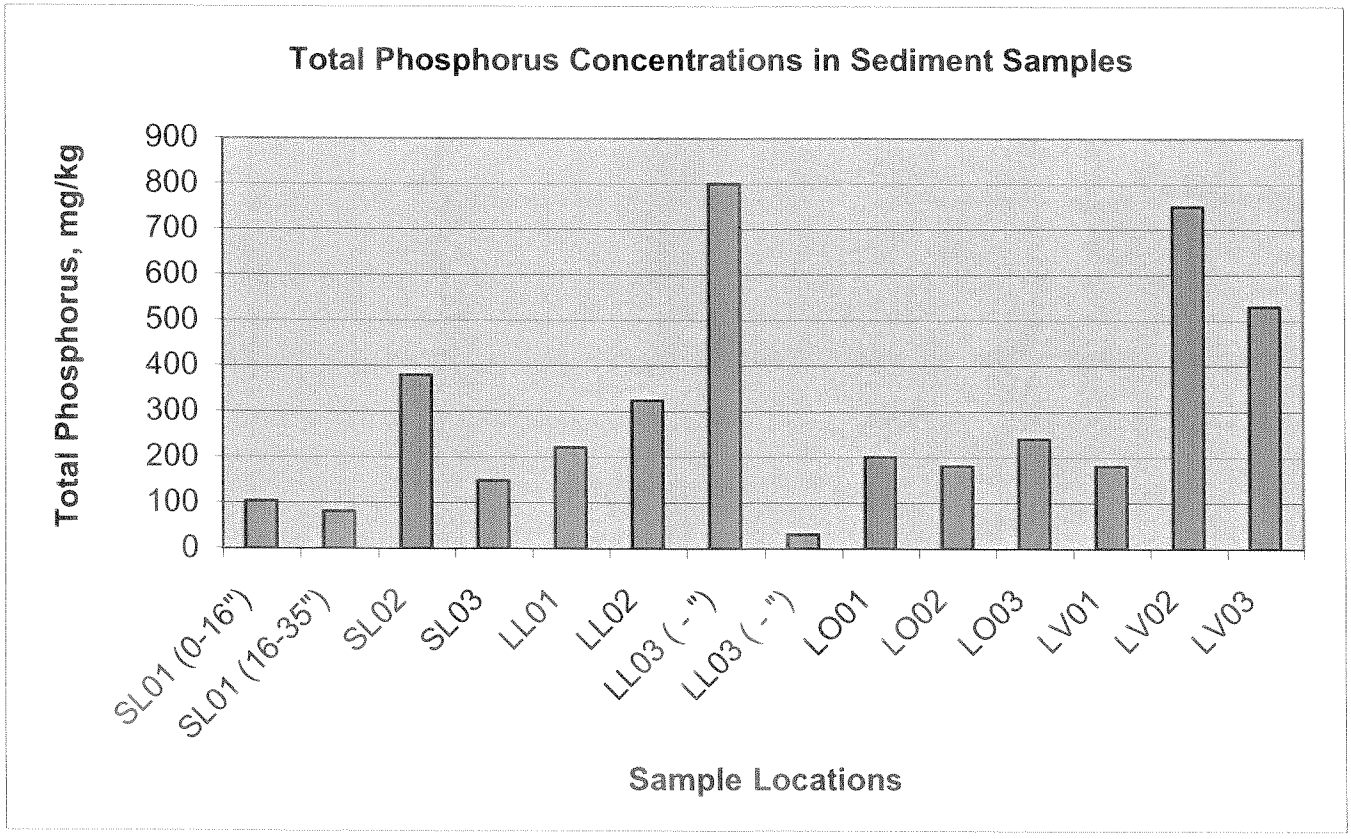

Cadmium Concentrations in Sediment Samples
Cadmium, ug/kg
1000
900
800
700
600
500
400
300
200
100
0
ESL
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

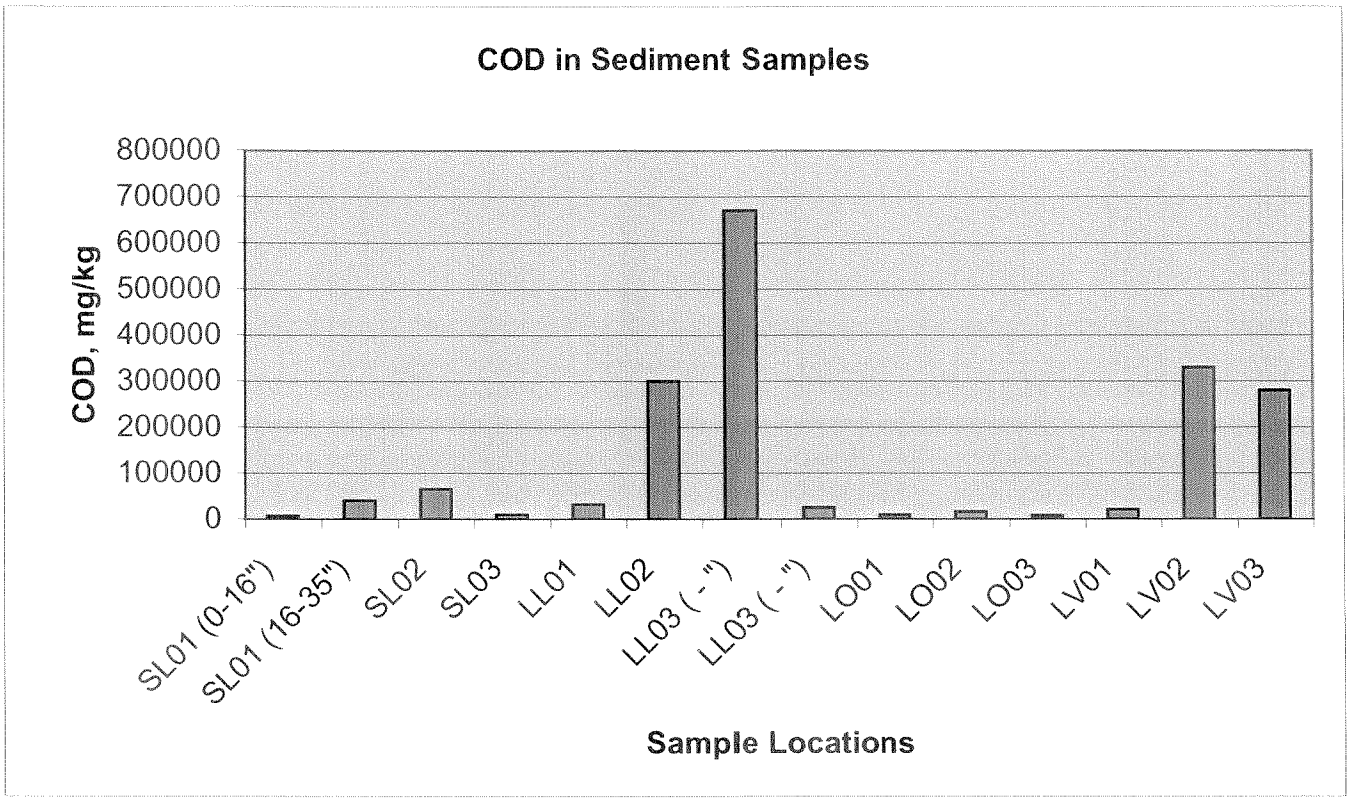

Chromium Concentrations in Sediment Samples
Chromium, ug/kg
16000
14000
12000
10000
8000
6000
4000
2000
0
ESL = 43,400
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

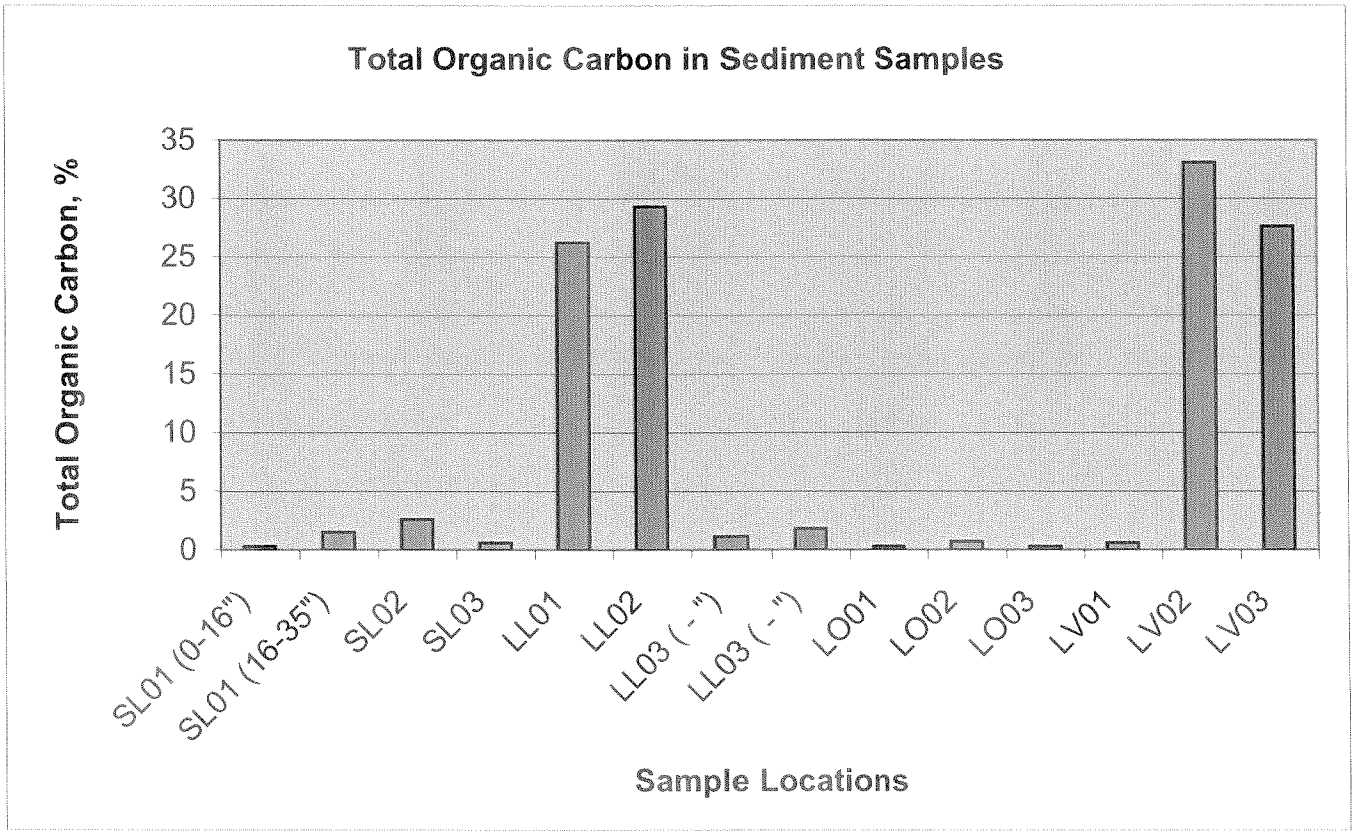

Copper Concentrations in Sediment Samples
Copper, ug/kg
25000
20000
15000
10000
5000
0
ESL = 31,600
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

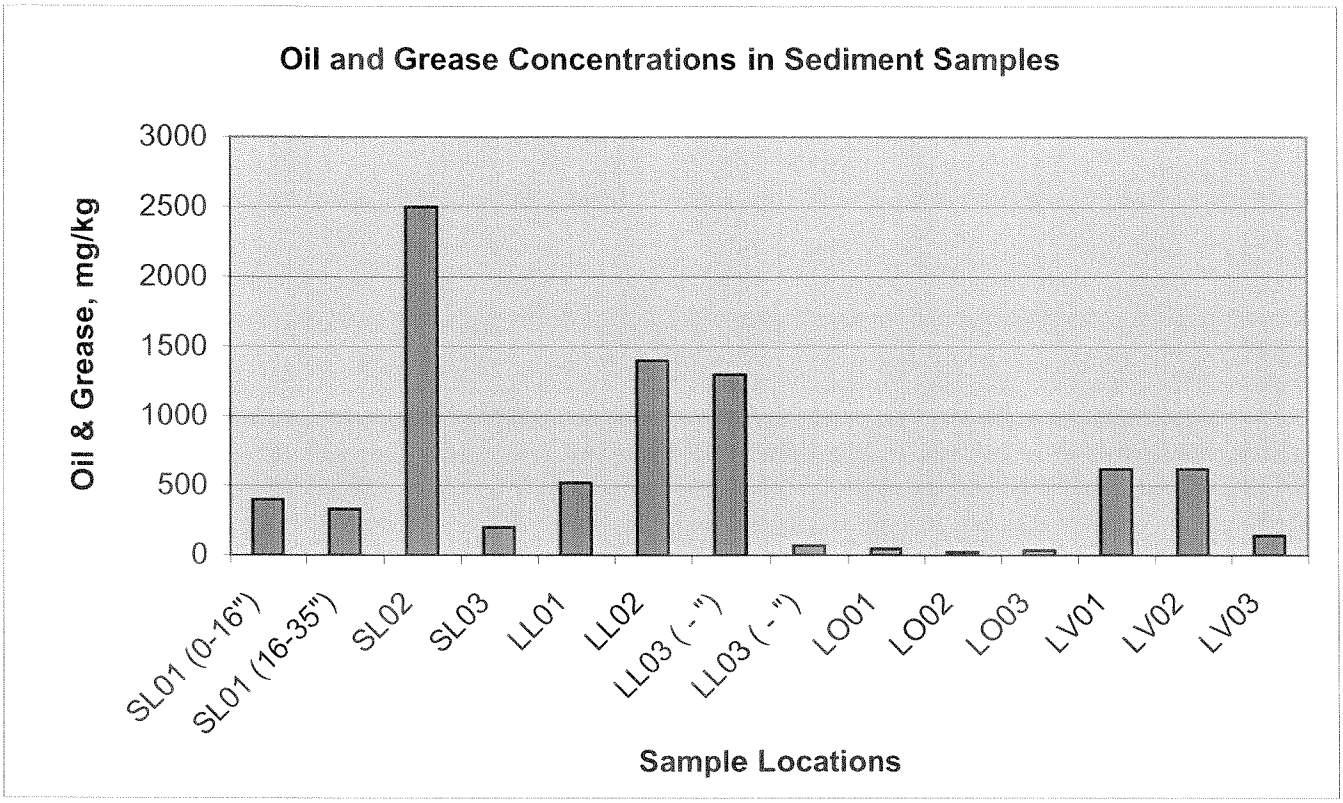

Lead Concentrations in Sediment Samples
Lead, ug/kg
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
PEC
ESL
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

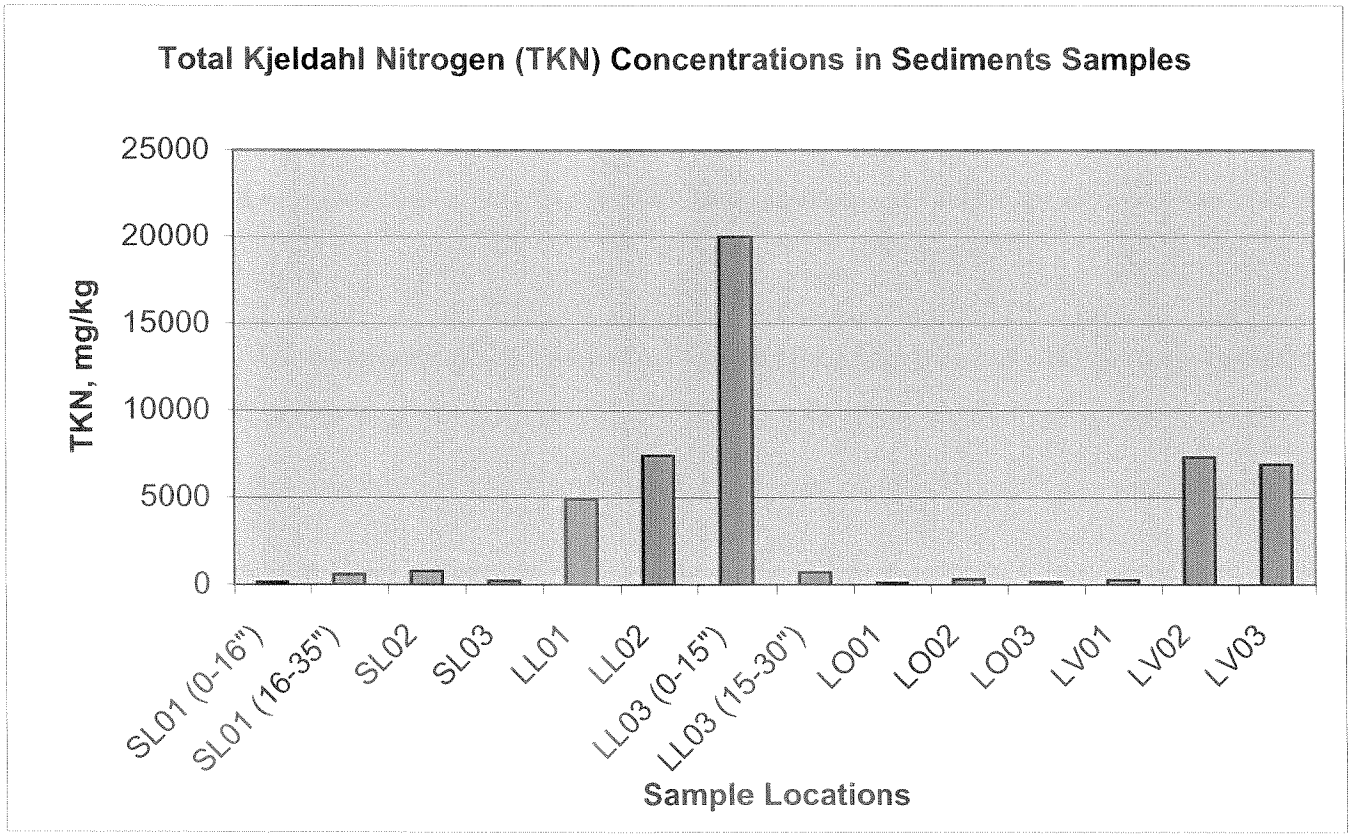

Zinc Concentrations in Sediment Samples
Zinc, ug/kg
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
ESL
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03
LL03
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

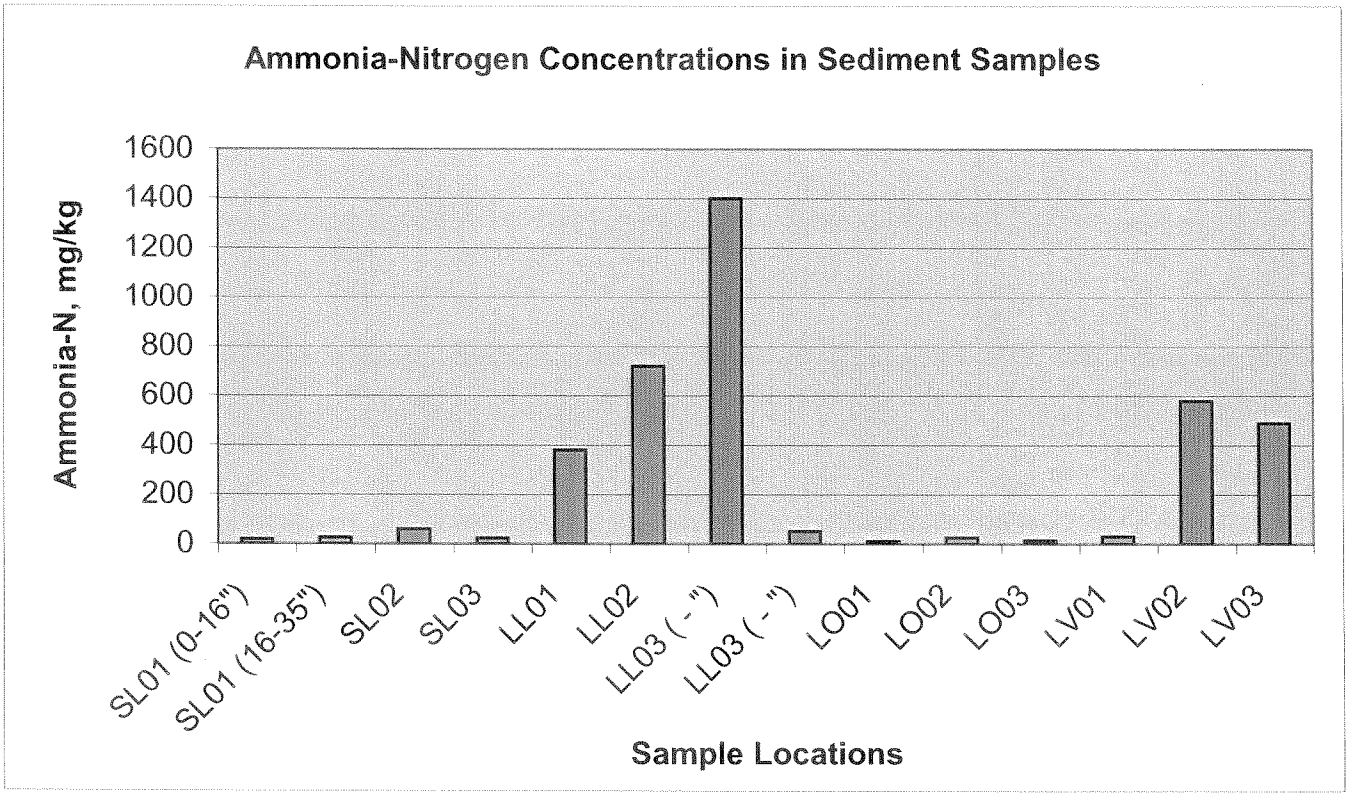

Total Phosphorus Concentrations in Sediment Samples
Total Phosphorus, mg/kg
900
800
700
600
500
400
300
200
100
0
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03 (- ")
LL03 (- ")
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations


COD in Sediment Samples
COD, mg/kg
800000
700000
600000
500000
400000
300000
200000
100000
0
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03 (- ")
LL03 (- ")
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations


Total Organic Carbon in Sediment Samples
Total Organic Carbon, %
35
30
25
20
15
10
5
0
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03 (- ")
LL03 (- ")
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations


Oil and Grease Concentrations in Sediment Samples
Oil & Grease, mg/kg
3000
2500
2000
1500
1000
500
0
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03 (- ")
LL03 (- ")
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations


Total Kjeldahl Nitrogen (TKN) Concentrations in Sediments Samples
TKN, mg/kg
25000
20000
15000
10000
5000
0
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03 (0-15")
LL03 (15-30")
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations


Ammonia-Nitrogen Concentrations in Sediment Samples
Ammonia-N, mg/kg
1600
1400
1200
1000
800
600
400
200
0
SL01 (0-16")
SL01 (16-35")
SL02
SL03
LL01
LL02
LL03 (- ")
LL03 (- ")
LO01
LO02
LO03
LV01
LV02
LV03
Sample Locations

5.0 CONCLUSIONS

- The results of this study establish a baseline for sediment quality in four inland lakes of Oakland County.

- Although samples from Lakeville Lake and Sylvan Lake contained parameters of interest at concentrations that exceed some commonly used sediment quality criteria, the chemical composition of sediment samples does not reflect a serious negative impact of stormwater runoff or any other contaminant source.

- Among the four lakes, Lake Orion had the lowest overall results for nearly every parameter.

- Toxicity assay results for Lakeville Lake and Sylvan Lake samples showed no significant decreases in either organism survival or growth.

- The results are in no sense surprising in view of the land uses surrounding these lakes and what is known about potential stormwater impacts. With the exception of periodic or routine monitoring activities, no additional sampling is recommended at this time.

6.0 REFERENCES

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Appendix A

Lake St. Clair Regional Monitoring Project

Table 3a.

Lake Sediment Data — Lakeville Lake (IL01), collected 1/22/04

Sample ID	LV0140122-601	LV0240122-602	LV0340122-603
Sample Location	**LV01**	**LV02**	**LV03**
PAHs, µg/kg			
Acenaphthene	< 320	< 780	< 690
Acenaphthylene	< 320	< 780	< 690
Anthracene	< 320	< 780	< 690
Benzo(a)anthracene	< 320	< 780	< 690
Benzo(a)pyrene	< 320	< 780	< 690
Benzo(b)fluoranthene	**370**	< 780	< 690
Benzo(g,h,i)perylene	< 320	< 780	< 690
Benzo(k)fluoranthene	< 320	< 780	< 690
Chrysene	**330**	< 780	< 690
Dibenzo(a,h)anthracene	< 320	< 780	< 690
Fluoranthene	**850**	< 780	< 690
Fluorene	< 320	< 780	< 690
Indeno(1,2,3-cd)pyrene	< 320	< 780	< 690
2-Methylnaphthalene	< 320	< 780	< 690
Naphthalene	< 320	< 780	< 690
Phenanthrene	**410**	< 780	< 690
Pyrene	**600**	< 780	< 690
PCB, µg/kg			
Aroclor 1016	< 130	< 310	< 280
Aroclor 1221	< 130	< 310	< 280
Aroclor 1232	< 130	< 310	< 280
Aroclor 1242	< 130	< 310	< 280
Aroclor 1248	< 130	< 310	< 280
Aroclor 1254	< 130	< 310	< 280
Aroclor 1260	< 130	< 310	< 280
Chlorinated Pesticides, µg/kg			
Aldrin	< 13	< 31	< 28
Dieldrin	< 13	< 31	< 28
Chlordane(Total)	< 63	< 160	< 140
4,4'-DDT	< 13	< 31	< 28
4,4'-DDE	< 13	< 31	< 28
4,4'-DDD	< 13	< 31	< 28
Endosulfan I	< 13	< 31	< 28
Endosulfan II	< 13	< 31	< 28
alpha-BHC	< 13	< 31	< 28
beta-BHC	< 13	< 31	< 28
gamma-BHC (Lindane)	< 13	< 31	< 28
delta-BHC	< 13	< 31	< 28
Endosulfan sulfate	< 13	< 31	< 28
Endrin	< 13	< 31	< 28
Endrin aldehyde	< 13	< 31	< 28
Heptachlor	< 13	< 31	< 28
Heptachlor epoxide	< 13	< 31	< 28
Methoxychlor	< 13	< 31	< 28
Toxaphene	< 630	< 1600	< 1400

Table 3a.

Lake Sediment Data **Lakeville Lake (IL01), collected 1/22/04**

Sample ID	LV0140122-601	LV0240122-602	LV0340122-603
Sample Location	**LV01**	**LV02**	**LV03**
ICP Metals, µg/kg			
Arsenic	**2200**	**10000**	**9400**
Barium	**13000**	**150000**	**120000**
Cadmium	**120**	**880**	**440**
Chromium	**9700**	**12000**	**7200**
Copper	**4300**	**19000**	**9200**
Lead	**33000**	**64000**	**26000**
Selenium	< 630	< 1600	<1400
Silver	< 630	< 1600	< 1400
Zinc	**25000**	**160000**	**64000**
Mercury	< 130	< 310	< 280

Total Phosphorus, mg/kg	**180**	**750**	**530**
COD, mg/kg	**21000**	**330000**	**280000**
Total Organic Carbon, TOC, %	**0.6**	**33.1**	**27.6**
Oil & Grease (FOG-HEM), mg/kg	**620**	**620**	**140**
Oil & Grease (FOG), mg/kg	**350**	**280**	< 2.8
Total Kjeldahl Nitrogen (TKN), mg/kg	**280**	**7300**	**6900**
Ammonia-Nitrogen, mg/kg	**31**	**580**	**490**
E. coli, CFU/g	**2**	**3**	**2**

Note: the relative percent difference criteria for the following constituents were exceeded:
Arsenic, Chromium, Lead, Total Phosphorus, Oil & Grease (FOG-HEM) and Ammonia-Nitrogen.
This may be due to either natural sediment heterogeneity, or field or laboratory operations. This variability indicates that the results for these parameters may not be viewed as "precise" but rather approximate.

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Table 3b.

Lake Sediment Data **Lake Orion (IL02), collected 12/2/03**

Sample ID	IL023122S01	IL023122S02	IL023122S03
Sample Location	**LO01**	**LO02**	**LO03**
PAHs, µg/kg			
Acenaphthene	< 290	< 290	< 280
Acenaphthylene	< 290	< 290	< 280
Anthracene	< 290	< 290	< 280
Benzo(a)anthracene	< 290	< 290	< 280
Benzo(a)pyrene	< 290	< 290	< 280
Benzo(b)fluoranthene	< 290	< 290	< 280
Benzo(g,h,i)perylene	< 290	< 290	< 280
Benzo(k)fluoranthene	< 290	< 290	< 280
Chrysene	< 290	< 290	< 280
Dibenzo(a,h)anthracene	< 290	< 290	< 280
Fluoranthene	< 290	< 290	< 280
Fluorene	< 290	< 290	< 280
Indeno(1,2,3-cd)pyrene	< 290	< 290	< 280
2-Methylnaphthalene	< 290	< 290	< 280
Naphthalene	< 290	< 290	< 280
Phenanthrene	< 290	< 290	< 280
Pyrene	< 290	< 290	< 280
PCB, µg/kg			
Aroclor 1016	< 120	< 120	< 110
Aroclor 1221	< 120	< 120	< 110
Aroclor 1232	< 120	< 120	< 110
Aroclor 1242	< 120	< 120	< 110
Aroclor 1248	< 120	< 120	< 110
Aroclor 1254	< 120	< 120	< 110
Aroclor 1260	< 120	< 120	< 110
Chlorinated Pesticides, µg/kg			
Aldrin	< 12	< 12	< 11
Dieldrin	< 12	< 12	< 11
Chlordane(Total)	< 59	< 59	< 57
4,4'-DDT	< 12	< 12	< 11
4,4'-DDE	< 12	< 12	< 11
4,4'-DDD	< 12	< 12	< 11
Endosulfan I	< 12	< 12	< 11
Endosulfan II	< 12	< 12	< 11
alpha-BHC	< 12	< 12	< 11
beta-BHC	< 12	< 12	< 11
gamma-BHC (Lindane)	< 12	< 12	< 11
delta-BHC	< 12	< 12	< 11
Endosulfan sulfate	< 12	< 12	< 11
Endrin	< 12	< 12	< 11
Endrin aldehyde	< 12	< 12	< 11
Heptachlor	< 12	< 12	< 11
Heptachlor epoxide	< 12	< 12	< 11
Methoxychlor	< 12	< 12	< 11
Toxaphene	< 590	< 590	< 570

Table 3b.
Lake Sediment Data **Lake Orion (IL02), collected 12/2/03**

Sample ID	**IL023122S01**	**IL023122S02**	**IL023122S03**
Sample Location	**LO01**	**LO02**	**LO03**
ICP Metals, µg/kg			
Arsenic	**4400**	**3100**	**6100**
Barium	**14000**	**20000**	**24000**
Cadmium	**96**	**120**	**110**
Chromium	**2900**	**5800**	**10000**
Copper	**3500**	**5100**	**9400**
Lead	**31000**	**8500**	**9100**
Selenium	< 590	< 590	< 570
Silver	< 590	< 590	< 570
Zinc	**21000**	**19000**	**26000**
Mercury	< 120	< 120	< 110

Total Phosphorus, mg/kg	**200**	**180**	**240**
COD, mg/kg	**9300**	**16000**	**7500**
Total Organic Carbon, TOC, %	**0.3**	**0.7**	**0.3**
Oil & Grease (FOG-HEM), mg/kg	**47**	**24**	**34**
Oil & Grease (FOG), mg/kg	< 1.2	< 1.2	< 1.1
Total Kjeldahl Nitrogen (TKN), mg/kg	**116**	**313**	**157**
Ammonia-Nitrogen, mg/kg	**12**	**26**	**14**
E. coli, CFU/g	na	na	na

Note: the relative percent difference criteria for the following constituents were exceeded:
Barium, Cadmium, Chromium, Copper, Lead, Total Phosphorus, COD, and Oil & Grease (FOG-HEM).
This may be due to either natural sediment heterogeneity, or field or laboratory operations. This variability indicates that the results for these parameters may not be viewed as "precise" but rather approximate.

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Table 3c.

Lake Sediment Data **Loon Lake (IL03), collected 12/15/03**

Sample ID	IL0331215S01	IL0331215S02	IL0331215S03	IL0331215S04
Sample Location	**LL01**	**LL02**	**LL03 (- '')**	**LL03 (- '')**
PAHs, µg/kg				
Acenaphthene	< 740	< 740	< 1500	< 480
Acenaphthylene	< 740	< 740	< 1500	< 480
Anthracene	< 740	< 740	< 1500	< 480
Benzo(a)anthracene	< 740	< 740	< 1500	< 480
Benzo(a)pyrene	< 740	< 740	< 1500	< 480
Benzo(b)fluoranthene	< 740	< 740	< 1500	< 480
Benzo(g,h,i)perylene	< 740	< 740	< 1500	< 480
Benzo(k)fluoranthene	< 740	< 740	< 1500	< 480
Chrysene	< 740	< 740	< 1500	< 480
Dibenzo(a,h)anthracene	< 740	< 740	< 1500	< 480
Fluoranthene	< 740	< 740	< 1500	< 480
Fluorene	< 740	< 740	< 1500	< 480
Indeno(1,2,3-cd)pyrene	< 740	< 740	< 1500	< 480
2-Methylnaphthalene	< 740	< 740	< 1500	< 480
Naphthalene	< 740	< 740	< 1500	< 480
Phenanthrene	< 740	< 740	< 1500	< 480
Pyrene	< 740	< 740	< 1500	< 480
PCB, µg/kg				
Aroclor 1016	< 150	< 150	< 290	< 96
Aroclor 1221	< 150	< 150	< 290	< 96
Aroclor 1232	< 150	< 150	< 290	< 96
Aroclor 1242	< 150	< 150	< 290	< 96
Aroclor 1248	< 150	< 150	< 290	< 96
Aroclor 1254	< 150	< 150	< 290	< 96
Aroclor 1260	< 150	< 150	< 290	< 96
Chlorinated Pesticides, µg/kg				
Aldrin	< 15	< 15	< 29	< 9.6
Dieldrin	< 15	< 15	< 29	< 9.6
Chlordane(Total)	< 74	< 74	< 150	< 48
4,4'-DDT	< 15	< 15	< 29	< 9.6
4,4'-DDE	< 15	< 15	< 29	< 9.6
4,4'-DDD	< 15	< 15	< 29	< 9.6
Endosulfan I	< 15	< 15	< 29	< 9.6
Endosulfan II	< 15	< 15	< 29	< 9.6
alpha-BHC	< 15	< 15	< 29	< 9.6
beta-BHC	< 15	< 15	< 29	< 9.6
gamma-BHC (Lindane)	< 15	< 15	< 29	< 9.6
delta-BHC	< 15	< 15	< 29	< 9.6
Endosulfan sulfate	< 15	< 15	< 29	< 9.6
Endrin	< 15	< 15	< 29	< 9.6
Endrin aldehyde	< 15	< 15	< 29	< 9.6
Heptachlor	< 15	< 15	< 29	< 9.6
Heptachlor epoxide	< 15	< 15	< 29	< 9.6
Methoxychlor	< 15	< 15	< 29	< 9.6
Toxaphene	< 740	< 740	< 2900	< 960

Table 3c.
Lake Sediment Data **Loon Lake (IL03), collected 12/15/03**

Sample ID	**IL0331215S01**	**IL0331215S02**	**IL0331215S03**	**IL0331215S04**
Sample Location	**LL01**	**LL02**	**LL03 (- ")**	**LL03 (- ")**
ICP Metals, µg/kg				
Arsenic	**14100**	**8240**	**8820**	**1920**
Barium	**39400**	**42600**	**151000**	**156000**
Cadmium	**176**	**221**	**447**	**142**
Chromium	< 7350	< 7350	< 14700	< 4810
Copper	**4710**	**7940**	**12900**	< 1920
Lead	**5000**	**10000**	**19400**	< 1920
Selenium	< 1470	< 1470	< 2940	< 962
Silver	< 1470	< 1470	< 2940	< 962
Zinc	**27900**	**32900**	**43500**	**7120**
Mercury	< 290	< 290	< 590	< 190

Total Phosphorus, mg/kg	**221**	**324**	**800**	**30.8**
COD, mg/kg	**32000**	**300000**	**670000**	**25000**
Total Organic Carbon, TOC, %	**26.2**	**29.3**	**115**	**1.8**
Oil & Grease (FOG-HEM), mg/kg	**520**	**1400**	**1300**	**70**
Oil & Grease (FOG), mg/kg	**20**	**160**	**230**	< 1.0
Total Kjeldahl Nitrogen (TKN), mg/kg	**4900**	**7400**	**20000**	**700**
Ammonia-Nitrogen, mg/kg	**380**	**720**	**1400**	**52**
E. coli, CFU/g	na	na	na	na

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Table 3d.

Lake Sediment Data **Sylvan Lake (IL04), collected 12/13/03**

Sample ID	IL0431213S01	IL0431213S02	IL0431213S03	IL0431213S04
Sample Location	**SL01 (0-16")**	**SL01 (16-35")**	**SL02**	**SL03**
PAHs, µg/kg				
Acenaphthene	< 290	< 370	< 370	< 300
Acenaphthylene	< 290	< 370	< 370	< 300
Anthracene	< 290	< 370	< 370	< 300
Benzo(a)anthracene	< 290	< 370	< 370	**800**
Benzo(a)pyrene	< 290	< 370	< 370	**690**
Benzo(b)fluoranthene	< 290	< 370	< 370	**840**
Benzo(g,h,i)perylene	< 290	< 370	< 370	**630**
Benzo(k)fluoranthene	< 290	< 370	< 370	**770**
Chrysene	< 290	< 370	< 370	**1400**
Dibenzo(a,h)anthracene	< 290	< 370	< 370	< 300
Fluoranthene	< 290	< 370	< 370	**2900**
Fluorene	< 290	< 370	< 370	< 300
Indeno(1,2,3-cd)pyrene	< 290	< 370	< 370	**610**
2-Methylnaphthalene	< 290	< 370	< 370	< 300
Naphthalene	< 290	< 370	< 370	< 300
Phenanthrene	< 290	< 370	< 370	**910**
Pyrene	< 290	< 370	< 370	**2200**
PCB, µg/kg				
Aroclor 1016	< 58	< 74	< 75	< 61
Aroclor 1221	< 58	< 74	< 75	< 61
Aroclor 1232	< 58	< 74	< 75	< 61
Aroclor 1242	< 58	< 74	< 75	< 61
Aroclor 1248	< 58	< 74	< 75	< 61
Aroclor 1254	< 58	< 74	< 75	< 61
Aroclor 1260	< 58	< 74	< 75	< 61
Chlorinated Pesticides, µg/kg				
Aldrin	< 5.8	< 7.4	< 7.5	< 6.1
Dieldrin	< 5.8	< 7.4	< 7.5	< 6.1
Chlordane(Total)	< 29	< 37	< 37	< 30
4,4'-DDT	< 5.8	< 7.4	< 7.5	< 6.1
4,4'-DDE	< 5.8	< 7.4	< 7.5	< 6.1
4,4'-DDD	< 5.8	< 7.4	< 7.5	< 6.1
Endosulfan I	< 5.8	< 7.4	< 7.5	< 6.1
Endosulfan II	< 5.8	< 7.4	< 7.5	< 6.1
alpha-BHC	< 5.8	< 7.4	< 7.5	< 6.1
beta-BHC	< 5.8	< 7.4	< 7.5	< 6.1
gamma-BHC (Lindane)	< 5.8	< 7.4	< 7.5	< 6.1
delta-BHC	< 5.8	< 7.4	< 7.5	< 6.1
Endosulfan sulfate	< 5.8	< 7.4	< 7.5	< 6.1
Endrin	< 5.8	< 7.4	< 7.5	< 6.1
Endrin aldehyde	< 5.8	< 7.4	< 7.5	< 6.1
Heptachlor	< 5.8	< 7.4	< 7.5	< 6.1
Heptachlor epoxide	< 5.8	< 7.4	< 7.5	< 6.1
Methoxychlor	< 5.8	< 7.4	< 7.5	< 6.1
Toxaphene	< 290	< 370	< 370	< 300

Table 3d.
Lake Sediment Data **Sylvan Lake (IL04), collected 12/13/03**

Sample ID	IL0431213S01	IL0431213S02	IL0431213S03	IL0431213S04
Sample Location	SL01 (0-16")	SL01 (16-35")	SL02	SL03
ICP Metals, µg/kg				
Arsenic	**1740**	**2650**	**6570**	**2320**
Barium	**23300**	**129000**	**77600**	**9760**
Cadmium	< 58.1	**162**	**716**	**220**
Chromium	**3600**	< 3680	**14500**	**7440**
Copper	**1630**	**1620**	**22800**	**9880**
Lead	**5170**	**2500**	**157000**	**39400**
Selenium	< 581	< 735	< 746	< 610
Silver	< 581	< 735	< 746	< 610
Zinc	**12100**	**15900**	**131000**	**46300**
Mercury	< 120	< 150	< 150	< 120

Total Phosphorus, mg/kg	**103**	**80.4**	**379**	**148**
COD, mg/kg	**6600**	**40000**	**65000**	**9700**
Total Organic Carbon, TOC, %	**0.3**	**1.5**	**2.6**	**0.6**
Oil & Grease (FOG-HEM), mg/kg	**400**	**330**	**2500**	**200**
Oil & Grease (FOG), mg/kg	**30**	< 1.0	**2000**	**190**
Total Kjeldahl Nitrogen (TKN), mg/kg	**150**	**580**	**780**	**220**
Ammonia-Nitrogen, mg/kg	**18**	**26**	**59**	**23**
E. coli, CFU/g	na	na	na	na

Note: the relative percent difference criteria for the following constituents were exceeded:
COD, Oil & Grease (FOG-HEM and FOG), TKN, Ammonia-Nitrogen.
This may be due to either natural sediment heterogeneity, or field or laboratory operations. This variability indicates that the results for these parameters may not be viewed as "precise" but rather approximate.

Table 4.
Sediment Constituents Compared to
Ecological Screening Levels (ESL)
and Probable Effects Concentration (PEC)
(all concentrations in µg/kg)

Metals	ESL	PEC	Sample Concentration	Sample Identification
Arsenic	9,790	33,000	10,000	LV02
			14,100	LL01
Lead	35,800	128,000	157,000	SL02
			64,000	LV02
Zinc	121,000	459,000	160,000	LV02
			131,000	SL02
Polynuclear Aromatic Hydrocarbons				
Benzo(a)anthracene	108	1,050	800	SL03
Benzo(a)pyrene	150	1,450	690	SL03
Chrysene	166	1,290	1,400	SL03
Fluoranthene	423	2,230	2,900	SL03
Phenanthrene	204	1,170	910	SL03
Pyrene	195	1,520	2,200	SL03
*Benzo(g,h,i)perylene	170	670	630	SL03
*Benzo(k)fluoranthene	240	1,800	770	SL03
*Indeno(1,2,3-cd)pyrene	200	600	610	SL03

SL = Sylvan Lake
LV = Lakeville Lake
LL=Loon Lake
EPA ESLs from USEPA Region 5 Resource Conservation and Recovery Act Ecological Screening Levels, August 2003
PEC values taken from MacDonald, et al., 2000
* These three PAHs were detected in SL03 (see Table 3d) but no PEC values are available for these compounds. Apparent Effects Threshold (AET) values (summarized in Buchman, 1999) were referenced for comparison.

Table 5

Toxicity Results for Lakeville Lake and Sylvan Lake

Endpoint	Lab Control	LV-01	LV-02	SL-02	SL-03
Hyalella azteca Survival (%)	98	94	93	94	95
Chiroomus tentans Survival (%)	98	89	88	99	93
C. tentans Dried Weight (mg/org)	1.09	1.48	1.51	1.64	2.22
C. tentans AFDW (mg/org)	0.82	1.19	1.11	1.04	1.15

AFDW = ash-free dry weight

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Table A1
Lake Sediment Data

Duplicate samples

Sample ID	IL0431213S01	IL0431213S81	RPD%	IL023122S01	IL023122SDUP	RPD%	LV0340122-603	LV-Duplicate	%RPD
	Sylvan Lake			Lake Orion			Lakeville Lake		
PAHs, µg/kg									
Acenaphthene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Acenaphthylene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Anthracene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Benzo(a)anthracene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Benzo(a)pyrene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Benzo(b)fluoranthene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Benzo(g,h,i)perylene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Benzo(k)fluoranthene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Chrysene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Dibenzo(a,h)anthracene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Fluoranthene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Fluorene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Indeno(1,2,3-cd)pyrene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
2-Methylnaphthalene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Naphthalene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Phenanthrene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
Pyrene	< 290	< 290	--	< 290	< 290	--	< 690	< 760	--
PCB, µg/kg									
Aroclor 1016	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--
Aroclor 1221	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--
Aroclor 1232	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--
Aroclor 1242	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--
Aroclor 1248	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--
Aroclor 1254	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--
Aroclor 1260	< 58	< 59	--	< 120	< 120	--	< 280	< 300	--

Sample ID	IL0431213S01	IL0431213S81	RPD%	IL023122S01	IL023122SDUP	RPD%	LV0340122-603	LV-Duplicate	%RPD
	Sylvan Lake			Lake Orion			Lakeville Lake		
Chlorinated Pesticides, µg/kg									
Aldrin	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Dieldrin	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Chlordane(Total)	< 29	< 29	--	< 59	< 58	--	< 140	< 150	--
4,4'-DDT	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
4,4'-DDE	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
4,4'-DDD	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Endosulfan I	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Endosulfan II	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
alpha-BHC	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
beta-BHC	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
gamma-BHC (Lindane)	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
delta-BHC	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Endosulfan sulfate	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Endrin	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Endrin aldehyde	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Heptachlor	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Heptachlor epoxide	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Methoxychlor	< 5.8	< 5.9	--	< 12	< 12	--	< 28	< 30	--
Toxaphene	< 290	< 290	--	< 590	< 580	--	< 1400	< 1500	--
ICP Metals, µg/kg									
Arsenic	1740	2000	-13.9	4400	4000	9.5	9400	7300	25.1
Barium	23300	25100	-7.4	14000	11000	24.0	120000	120000	0.0
Cadmium	< 58.1	< 58.8	--	96	76	23.3	440	480	-8.7
Chromium	3600.0	3180	12.4	2900	4300	-38.9	7200	11000	-41.8
Copper	1630	< 1180	--	3500	4500	-25.0	9200	11000	-17.8
Lead	5170	4240	19.8	31000	43000	-32.4	26000	39000	-40.0
Selenium	< 581	< 588	--	< 590	< 580	--	<1400	< 1500	--
Silver	< 581	< 588	--	< 590	< 580	--	< 1400	< 1500	--
Zinc	12100	11200	7.7	21000	18000	15.4	64000	83000	-25.9
Mercury	< 120	< 120	--	< 120	< 120	--	< 280	< 300	--

Total Phosphorus, mg/kg	103.0	96.1	6.9	200	100	66.7	530	700	-27.6
COD, mg/kg	6600	9800	-39.0	9300	7600	20.1	280000	290000	-3.5
Total Organic Carbon, TOC, %	0.3	0.3	0.0	0.3	0.3	0.0	27.6	24.2	13.1
Oil & Grease (FOG-HEM), mg/kg	400	160	85.7	47	70	-39.3	140	270	-63.4
Oil & Grease (FOG), mg/kg	30	15	66.7	< 1.2	< 1.2	--	< 2.8	< 3.0	--
Total Kjeldahl Nitrogen (TKN), mg/kg	150	190	-23.5	116	112	3.5	6900	7200	-4.3
Ammonia-Nitrogen, mg/kg	18	9.8	59.0	12	12	0.0	490	610	-21.8
E. coli, CFU/g	na	na	na	na	na	na	2	< 1	--

Appendix B

RTI LABORATORIES, INC.
Environmental, Chemical & Metallurgical Testing

Report of Analytical Services

Environmental Consult. & Tech.
Attn: Mark Mikesell
719 Griswold
Suite 520
Detroit, MI 48226

RTI Project#:	03-5523
Date Reported:	12/31/03
Date Completed:	12/31/03
Date Received:	12/16/03
PO #:	
Report Number: 03-5523-1	**Fax:** 313-963-1707

Project Title: 8270-PNA, 8082-PCB, Pesticides, Metals, COD, TOC, FOG, TKN, Ammonia
Project Description: 9 Sediment Smaples
Project Name/#: LSCWQM; 03
Project Remarks:

Sample Summary

	Sample ID	RTI Sample#	Sample Matrix	Date Collected
1	1L0431213S01	03-5523-001	Sediment	12/13/03
2	1L0431213S02	03-5523-002	Sediment	12/13/03
3	1L0431213S81	03-5523-003	Sediment	12/13/03
4	1L0431213S03	03-5523-004	Sediment	12/13/03
5	1L0431213S04	03-5523-005	Sediment	12/13/03
6	1L0331215S01	03-5523-006	Sediment	12/15/03
7	1L0331215S02	03-5523-007	Sediment	12/15/03
8	1L0331215S03	03-5523-008	Sediment	12/15/03
9	1L0331215S04	03-5523-009	Sediment	12/15/03

Approved by : _____ Date: _____

David Vesey, Laboratory Manager,Environmental

RESULTS OF ANALYSIS

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 2 of 38

Sample ID: 03-5523-001; 1L0431213S01

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 290	290	ug/kg
Acenaphthylene	< 290	290	ug/kg
Anthracene	< 290	290	ug/kg
Benzo(a)anthracene	< 290	290	ug/kg
Benzo(a)pyrene	< 290	290	ug/kg
Benzo(b)fluoranthene	< 290	290	ug/kg
Benzo(ghi)Perylene	< 290	290	ug/kg
Benzo(k)fluoranthene	< 290	290	ug/kg
Chrysene	< 290	290	ug/kg
Dibenzo(a,h)anthracene	< 290	290	ug/kg
Fluoranthene	< 290	290	ug/kg
Fluorene	< 290	290	ug/kg
Indeno(1,2,3-cd)pyrene	< 290	290	ug/kg
2-Methylnaphthalene	< 290	290	ug/kg
Naphthalene	< 290	290	ug/kg
Phenanthrene	< 290	290	ug/kg
Pyrene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**57.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**63.0**	23 - 120	
Terphenyl-d14 (surr.)	**59.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aroclor 1016	< 58	58	ug/kg
Aroclor 1221	< 58	58	ug/kg
Aroclor 1232	< 58	58	ug/kg
Aroclor 1242	< 58	58	ug/kg

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 03-5523-001; 1L0431213S01

Aroclor 1248	< 58	58	ug/kg
Aroclor 1254	< 58	58	ug/kg
Aroclor 1260	< 58	58	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**34**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 5.8	5.8	ug/kg
Dieldrin	< 5.8	5.8	ug/kg
Chlordane(Total)	< 29	29	ug/kg
4,4'-DDT	< 5.8	5.8	ug/kg
4,4'-DDE	< 5.8	5.8	ug/kg
4,4'-DDD	< 5.8	5.8	ug/kg
Endosulfan I	< 5.8	5.8	ug/kg
Endosulfan II	< 5.8	5.8	ug/kg
alpha-BHC	< 5.8	5.8	ug/kg
beta-BHC	< 5.8	5.8	ug/kg
gamma-BHC (Lindane)	< 5.8	5.8	ug/kg
delta-BHC	< 5.8	5.8	ug/kg
Endosulfan sulfate	< 5.8	5.8	ug/kg
Endrin	< 5.8	5.8	ug/kg
Endrin aldehyde	< 5.8	5.8	ug/kg
Heptachlor	< 5.8	5.8	ug/kg
Heptachlor epoxide	< 5.8	5.8	ug/kg
Methoxychlor	< 5.8	5.8	ug/kg
Toxaphene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**34.0**	30 - 115	

continued from previous page...

Sample ID: 03-5523-001; 1L0431213S01

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Analyte	Result	PQL	Units
Arsenic, As	**1740**	1160	ug/kg
Barium, Ba	**23300**	1160	ug/kg
Cadmium, Cd	< 58.1	58.1	ug/kg
Chromium, Cr	**3600**	2910	ug/kg
Lead, Pb	**5170**	1160	ug/kg
Selenium, Se	< 581	581	ug/kg
Silver, Ag	< 581	581	ug/kg
Copper, Cu	**1630**	1160	ug/kg
Zinc, Zn	**12100**	1160	ug/kg
Phosphorus, as P	**103000**	1160	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Mercury, Hg	< 120	120	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
COD	**6600**	23	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Carbon, Total Organic, TOC	**0.3**	0.1	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	**400**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	**30**	1.0	mg/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 5 of 38

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Sample ID: 03-5523-001; 1L0431213S01

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Total Kjeldahl (TKN)	**150**	1.2	mg/kg

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**18**	0.12	mg/kg

Sample ID: 03-5523-002; 1L0431213S02

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 370	370	ug/kg
Acenaphthylene	< 370	370	ug/kg
Anthracene	< 370	370	ug/kg
Benzo(a)anthracene	< 370	370	ug/kg
Benzo(a)pyrene	< 370	370	ug/kg
Benzo(b)fluoranthene	< 370	370	ug/kg
Benzo(ghi)Perylene	< 370	370	ug/kg
Benzo(k)fluoranthene	< 370	370	ug/kg
Chrysene	< 370	370	ug/kg
Dibenzo(a,h)anthracene	< 370	370	ug/kg
Fluoranthene	< 370	370	ug/kg
Fluorene	< 370	370	ug/kg
Indeno(1,2,3-cd)pyrene	< 370	370	ug/kg
2-Methylnaphthalene	< 370	370	ug/kg
Naphthalene	< 370	370	ug/kg
Phenanthrene	< 370	370	ug/kg
Pyrene	< 370	370	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**70.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**82.0**	23 - 120	
Terphenyl-d14 (surr.)	**75.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 74	74	ug/kg
Aroclor 1221	< 74	74	ug/kg
Aroclor 1232	< 74	74	ug/kg
Aroclor 1242	< 74	74	ug/kg
Aroclor 1248	< 74	74	ug/kg
Aroclor 1254	< 74	74	ug/kg

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Sample ID: 03-5523-002; 1L0431213S02

Analyte	Result	PQL	Units
Aroclor 1260	< 74	74	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**64**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 7.4	7.4	ug/kg
Dieldrin	< 7.4	7.4	ug/kg
Chlordane(Total)	< 37	37	ug/kg
4,4'-DDT	< 7.4	7.4	ug/kg
4,4'-DDE	< 7.4	7.4	ug/kg
4,4'-DDD	< 7.4	7.4	ug/kg
Endosulfan I	< 7.4	7.4	ug/kg
Endosulfan II	< 7.4	7.4	ug/kg
alpha-BHC	< 7.4	7.4	ug/kg
beta-BHC	< 7.4	7.4	ug/kg
gamma-BHC (Lindane)	< 7.4	7.4	ug/kg
delta-BHC	< 7.4	7.4	ug/kg
Endosulfan sulfate	< 7.4	7.4	ug/kg
Endrin	< 7.4	7.4	ug/kg
Endrin aldehyde	< 7.4	7.4	ug/kg
Heptachlor	< 7.4	7.4	ug/kg
Heptachlor epoxide	< 7.4	7.4	ug/kg
Methoxychlor	< 7.4	7.4	ug/kg
Toxaphene	< 370	370	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**64.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**2650**	1470	ug/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
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Sample ID: 03-5523-002; 1L0431213S02

Analyte	Result	PQL	Units
Barium, Ba	**129000**	1470	ug/kg
Cadmium, Cd	**162**	73.5	ug/kg
Chromium, Cr	< 3680	3680	ug/kg
Lead, Pb	**2500**	1470	ug/kg
Selenium, Se	< 735	735	ug/kg
Silver, Ag	< 735	735	ug/kg
Copper, Cu	**1620**	1470	ug/kg
Zinc, Zn	**15900**	1470	ug/kg
Phosphorus, as P	**80400**	1470	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 150	150	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**40000**	29	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**1.5**	0.1	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**330**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	< 1.0	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**580**	1.5	mg/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
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Sample ID: 03-5523-002; 1L0431213S02

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**26**	0.15	mg/kg

Sample ID: 03-5523-003; 1L0431213S81

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 290	290	ug/kg
Acenaphthylene	< 290	290	ug/kg
Anthracene	< 290	290	ug/kg
Benzo(a)anthracene	< 290	290	ug/kg
Benzo(a)pyrene	< 290	290	ug/kg
Benzo(b)fluoranthene	< 290	290	ug/kg
Benzo(ghi)Perylene	< 290	290	ug/kg
Benzo(k)fluoranthene	< 290	290	ug/kg
Chrysene	< 290	290	ug/kg
Dibenzo(a,h)anthracene	< 290	290	ug/kg
Fluoranthene	< 290	290	ug/kg
Fluorene	< 290	290	ug/kg
Indeno(1,2,3-cd)pyrene	< 290	290	ug/kg
2-Methylnaphthalene	< 290	290	ug/kg
Naphthalene	< 290	290	ug/kg
Phenanthrene	< 290	290	ug/kg
Pyrene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**73.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**76.0**	23 - 120	
Terphenyl-d14 (surr.)	**72.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 59	59	ug/kg
Aroclor 1221	< 59	59	ug/kg
Aroclor 1232	< 59	59	ug/kg
Aroclor 1242	< 59	59	ug/kg
Aroclor 1248	< 59	59	ug/kg
Aroclor 1254	< 59	59	ug/kg

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 03-5523-003; 1L0431213S81

Aroclor 1260	< 59	59	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**67**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 5.9	5.9	ug/kg
Dieldrin	< 5.9	5.9	ug/kg
Chlordane(Total)	< 29	29	ug/kg
4,4'-DDT	< 5.9	5.9	ug/kg
4,4'-DDE	< 5.9	5.9	ug/kg
4,4'-DDD	< 5.9	5.9	ug/kg
Endosulfan I	< 5.9	5.9	ug/kg
Endosulfan II	< 5.9	5.9	ug/kg
alpha-BHC	< 5.9	5.9	ug/kg
beta-BHC	< 5.9	5.9	ug/kg
gamma-BHC (Lindane)	< 5.9	5.9	ug/kg
delta-BHC	< 5.9	5.9	ug/kg
Endosulfan sulfate	< 5.9	5.9	ug/kg
Endrin	< 5.9	5.9	ug/kg
Endrin aldehyde	< 5.9	5.9	ug/kg
Heptachlor	< 5.9	5.9	ug/kg
Heptachlor epoxide	< 5.9	5.9	ug/kg
Methoxychlor	< 5.9	5.9	ug/kg
Toxaphene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**67.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**2000**	1180	ug/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 12 of 38

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Sample ID: 03-5523-003; 1L0431213S81

Analyte	Result	PQL	Units
Barium, Ba	**25100**	1180	ug/kg
Cadmium, Cd	< 58.8	58.8	ug/kg
Chromium, Cr	**3180**	2940	ug/kg
Lead, Pb	**4240**	1180	ug/kg
Selenium, Se	< 588	588	ug/kg
Silver, Ag	< 588	588	ug/kg
Copper, Cu	< 1180	1180	ug/kg
Zinc, Zn	**11200**	1180	ug/kg
Phosphorus, as P	**96100**	1180	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 120	120	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**9800**	24	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**0.3**	0.1	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**160**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	**15**	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**190**	1.2	mg/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 13 of 38

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Sample ID: 03-5523-003; 1L0431213S81

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**9.8**	0.12	mg/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 14 of 38

Sample ID: 03-5523-004; 1L0431213S03

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 370	370	ug/kg
Acenaphthylene	< 370	370	ug/kg
Anthracene	< 370	370	ug/kg
Benzo(a)anthracene	< 370	370	ug/kg
Benzo(a)pyrene	< 370	370	ug/kg
Benzo(b)fluoranthene	< 370	370	ug/kg
Benzo(ghi)Perylene	< 370	370	ug/kg
Benzo(k)fluoranthene	< 370	370	ug/kg
Chrysene	< 370	370	ug/kg
Dibenzo(a,h)anthracene	< 370	370	ug/kg
Fluoranthene	< 370	370	ug/kg
Fluorene	< 370	370	ug/kg
Indeno(1,2,3-cd)pyrene	< 370	370	ug/kg
2-Methylnaphthalene	< 370	370	ug/kg
Naphthalene	< 370	370	ug/kg
Phenanthrene	< 370	370	ug/kg
Pyrene	< 370	370	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**68.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**77.0**	23 - 120	
Terphenyl-d14 (surr.)	**63.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 75	75	ug/kg
Aroclor 1221	< 75	75	ug/kg
Aroclor 1232	< 75	75	ug/kg
Aroclor 1242	< 75	75	ug/kg
Aroclor 1248	< 75	75	ug/kg
Aroclor 1254	< 75	75	ug/kg

Client:	Environmental Consult. & Tech.	**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:** 03-5523-1	**Page:** Page 15 of 38

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Sample ID: 03-5523-004; 1L0431213S03

Analyte	Result	PQL	Units
Aroclor 1260	< 75	75	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**44**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 7.5	7.5	ug/kg
Dieldrin	< 7.5	7.5	ug/kg
Chlordane(Total)	< 37	37	ug/kg
4,4'-DDT	< 7.5	7.5	ug/kg
4,4'-DDE	< 7.5	7.5	ug/kg
4,4'-DDD	< 7.5	7.5	ug/kg
Endosulfan I	< 7.5	7.5	ug/kg
Endosulfan II	< 7.5	7.5	ug/kg
alpha-BHC	< 7.5	7.5	ug/kg
beta-BHC	< 7.5	7.5	ug/kg
gamma-BHC (Lindane)	< 7.5	7.5	ug/kg
delta-BHC	< 7.5	7.5	ug/kg
Endosulfan sulfate	< 7.5	7.5	ug/kg
Endrin	< 7.5	7.5	ug/kg
Endrin aldehyde	< 7.5	7.5	ug/kg
Heptachlor	< 7.5	7.5	ug/kg
Heptachlor epoxide	< 7.5	7.5	ug/kg
Methoxychlor	< 7.5	7.5	ug/kg
Toxaphene	< 370	370	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**44.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**6570**	1490	ug/kg

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Sample ID: 03-5523-004; 1L0431213S03

Analyte	Result	PQL	Units
Barium, Ba	**77600**	1490	ug/kg
Cadmium, Cd	**716**	74.6	ug/kg
Chromium, Cr	**14500**	3730	ug/kg
Lead, Pb	**157000**	1490	ug/kg
Selenium, Se	< 746	746	ug/kg
Silver, Ag	< 746	746	ug/kg
Copper, Cu	**22800**	1490	ug/kg
Zinc, Zn	**131000**	1490	ug/kg
Phosphorus, as P	**379000**	1490	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 150	150	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**65000**	30	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**2.6**	0.1	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**2500**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	**2000**	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**780**	1.5	mg/kg

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Sample ID: 03-5523-004; 1L0431213S03

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**59**	0.15	mg/kg

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Sample ID: 03-5523-005; 1L0431213S04

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 300	300	ug/kg
Acenaphthylene	< 300	300	ug/kg
Anthracene	< 300	300	ug/kg
Benzo(a)anthracene	**800**	300	ug/kg
Benzo(a)pyrene	**690**	300	ug/kg
Benzo(b)fluoranthene	**840**	300	ug/kg
Benzo(ghi)Perylene	**630**	300	ug/kg
Benzo(k)fluoranthene	**770**	300	ug/kg
Chrysene	**1400**	300	ug/kg
Dibenzo(a,h)anthracene	< 300	300	ug/kg
Fluoranthene	**2900**	300	ug/kg
Fluorene	< 300	300	ug/kg
Indeno(1,2,3-cd)pyrene	**610**	300	ug/kg
2-Methylnaphthalene	< 300	300	ug/kg
Naphthalene	< 300	300	ug/kg
Phenanthrene	**910**	300	ug/kg
Pyrene	**2200**	300	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**55.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**56.0**	23 - 120	
Terphenyl-d14 (surr.)	**73.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 61	61	ug/kg
Aroclor 1221	< 61	61	ug/kg
Aroclor 1232	< 61	61	ug/kg
Aroclor 1242	< 61	61	ug/kg
Aroclor 1248	< 61	61	ug/kg
Aroclor 1254	< 61	61	ug/kg

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Sample ID: 03-5523-005; 1L0431213S04

Analyte	Result	PQL	Units
Aroclor 1260	< 61	61	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**67**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 6.1	6.1	ug/kg
Dieldrin	< 6.1	6.1	ug/kg
Chlordane(Total)	< 30	30	ug/kg
4,4'-DDT	< 6.1	6.1	ug/kg
4,4'-DDE	< 6.1	6.1	ug/kg
4,4'-DDD	< 6.1	6.1	ug/kg
Endosulfan I	< 6.1	6.1	ug/kg
Endosulfan II	< 6.1	6.1	ug/kg
alpha-BHC	< 6.1	6.1	ug/kg
beta-BHC	< 6.1	6.1	ug/kg
gamma-BHC (Lindane)	< 6.1	6.1	ug/kg
delta-BHC	< 6.1	6.1	ug/kg
Endosulfan sulfate	< 6.1	6.1	ug/kg
Endrin	< 6.1	6.1	ug/kg
Endrin aldehyde	< 6.1	6.1	ug/kg
Heptachlor	< 6.1	6.1	ug/kg
Heptachlor epoxide	< 6.1	6.1	ug/kg
Methoxychlor	< 6.1	6.1	ug/kg
Toxaphene	< 300	300	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**67.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**2320**	1220	ug/kg

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Sample ID: 03-5523-005; 1L0431213S04

Analyte	Result	PQL	Units
Barium, Ba	**9760**	1220	ug/kg
Cadmium, Cd	**220**	61.0	ug/kg
Chromium, Cr	**7440**	3050	ug/kg
Lead, Pb	**39400**	1220	ug/kg
Selenium, Se	< 610	610	ug/kg
Silver, Ag	< 610	610	ug/kg
Copper, Cu	**9880**	1220	ug/kg
Zinc, Zn	**46300**	1220	ug/kg
Phosphorus, as P	**148000**	1220	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 120	120	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**9700**	24	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**0.6**	0.1	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**200**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	**190**	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**220**	1.2	mg/kg

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Sample ID: 03-5523-005; 1L0431213S04

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**23**	0.12	mg/kg

Sample ID: 03-5523-006; 1L0331215S01

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 740	740	ug/kg
Acenaphthylene	< 740	740	ug/kg
Anthracene	< 740	740	ug/kg
Benzo(a)anthracene	< 740	740	ug/kg
Benzo(a)pyrene	< 740	740	ug/kg
Benzo(b)fluoranthene	< 740	740	ug/kg
Benzo(ghi)Perylene	< 740	740	ug/kg
Benzo(k)fluoranthene	< 740	740	ug/kg
Chrysene	< 740	740	ug/kg
Dibenzo(a,h)anthracene	< 740	740	ug/kg
Fluoranthene	< 740	740	ug/kg
Fluorene	< 740	740	ug/kg
Indeno(1,2,3-cd)pyrene	< 740	740	ug/kg
2-Methylnaphthalene	< 740	740	ug/kg
Naphthalene	< 740	740	ug/kg
Phenanthrene	< 740	740	ug/kg
Pyrene	< 740	740	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**69.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**77.0**	23 - 120	
Terphenyl-d14 (surr.)	**83.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 150	150	ug/kg
Aroclor 1221	< 150	150	ug/kg
Aroclor 1232	< 150	150	ug/kg
Aroclor 1242	< 150	150	ug/kg
Aroclor 1248	< 150	150	ug/kg
Aroclor 1254	< 150	150	ug/kg

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Sample ID: 03-5523-006; 1L0331215S01

Analyte	Result	PQL	Units
Aroclor 1260	< 150	150	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**62**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 15	15	ug/kg
Dieldrin	< 15	15	ug/kg
Chlordane(Total)	< 74	74	ug/kg
4,4'-DDT	< 15	15	ug/kg
4,4'-DDE	< 15	15	ug/kg
4,4'-DDD	< 15	15	ug/kg
Endosulfan I	< 15	15	ug/kg
Endosulfan II	< 15	15	ug/kg
alpha-BHC	< 15	15	ug/kg
beta-BHC	< 15	15	ug/kg
gamma-BHC (Lindane)	< 15	15	ug/kg
delta-BHC	< 15	15	ug/kg
Endosulfan sulfate	< 15	15	ug/kg
Endrin	< 15	15	ug/kg
Endrin aldehyde	< 15	15	ug/kg
Heptachlor	< 15	15	ug/kg
Heptachlor epoxide	< 15	15	ug/kg
Methoxychlor	< 15	15	ug/kg
Toxaphene	< 740	740	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**62.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**14100**	2940	ug/kg

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Sample ID: 03-5523-006; 1L0331215S01

Analyte	Result	PQL	Units
Barium, Ba	**39400**	2940	ug/kg
Cadmium, Cd	**176**	147	ug/kg
Chromium, Cr	< 7350	7350	ug/kg
Lead, Pb	**5000**	2940	ug/kg
Selenium, Se	< 1470	1470	ug/kg
Silver, Ag	< 1470	1470	ug/kg
Copper, Cu	**4710**	2940	ug/kg
Zinc, Zn	**27900**	2940	ug/kg
Phosphorus, as P	**221000**	2940	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 290	290	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**32000**	59	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**26.2**	0.3	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**520**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	**20**	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**4900**	2.9	mg/kg

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Sample ID: 03-5523-006; 1L0331215S01

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**380**	0.29	mg/kg

Sample ID: 03-5523-007; 1L0331215S02

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 740	740	ug/kg
Acenaphthylene	< 740	740	ug/kg
Anthracene	< 740	740	ug/kg
Benzo(a)anthracene	< 740	740	ug/kg
Benzo(a)pyrene	< 740	740	ug/kg
Benzo(b)fluoranthene	< 740	740	ug/kg
Benzo(ghi)Perylene	< 740	740	ug/kg
Benzo(k)fluoranthene	< 740	740	ug/kg
Chrysene	< 740	740	ug/kg
Dibenzo(a,h)anthracene	< 740	740	ug/kg
Fluoranthene	< 740	740	ug/kg
Fluorene	< 740	740	ug/kg
Indeno(1,2,3-cd)pyrene	< 740	740	ug/kg
2-Methylnaphthalene	< 740	740	ug/kg
Naphthalene	< 740	740	ug/kg
Phenanthrene	< 740	740	ug/kg
Pyrene	< 740	740	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**53.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**56.0**	23 - 120	
Terphenyl-d14 (surr.)	**52.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 150	150	ug/kg
Aroclor 1221	< 150	150	ug/kg
Aroclor 1232	< 150	150	ug/kg
Aroclor 1242	< 150	150	ug/kg
Aroclor 1248	< 150	150	ug/kg
Aroclor 1254	< 150	150	ug/kg

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Sample ID: 03-5523-007; 1L0331215S02

Analyte	Result	PQL	Units
Aroclor 1260	< 150	150	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**55**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 15	15	ug/kg
Dieldrin	< 15	15	ug/kg
Chlordane(Total)	< 74	74	ug/kg
4,4'-DDT	< 15	15	ug/kg
4,4'-DDE	< 15	15	ug/kg
4,4'-DDD	< 15	15	ug/kg
Endosulfan I	< 15	15	ug/kg
Endosulfan II	< 15	15	ug/kg
alpha-BHC	< 15	15	ug/kg
beta-BHC	< 15	15	ug/kg
gamma-BHC (Lindane)	< 15	15	ug/kg
delta-BHC	< 15	15	ug/kg
Endosulfan sulfate	< 15	15	ug/kg
Endrin	< 15	15	ug/kg
Endrin aldehyde	< 15	15	ug/kg
Heptachlor	< 15	15	ug/kg
Heptachlor epoxide	< 15	15	ug/kg
Methoxychlor	< 15	15	ug/kg
Toxaphene	< 740	740	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**55.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**8240**	2940	ug/kg

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Sample ID: 03-5523-007; 1L0331215S02

Analyte	Result	PQL	Units
Barium, Ba	**42600**	2940	ug/kg
Cadmium, Cd	**221**	147	ug/kg
Chromium, Cr	< 7350	7350	ug/kg
Lead, Pb	**10000**	2940	ug/kg
Selenium, Se	< 1470	1470	ug/kg
Silver, Ag	< 1470	1470	ug/kg
Copper, Cu	**7940**	2940	ug/kg
Zinc, Zn	**32900**	2940	ug/kg
Phosphorus, as P	**324000**	2940	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 290	290	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**300000**	59	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**29.3**	0.3	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**1400**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	**160**	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**7400**	2.9	mg/kg

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Sample ID: 03-5523-007; 1L0331215S02

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**720**	0.29	mg/kg

Sample ID: 03-5523-008; 1L0331215S03

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 1500	1500	ug/kg
Acenaphthylene	< 1500	1500	ug/kg
Anthracene	< 1500	1500	ug/kg
Benzo(a)anthracene	< 1500	1500	ug/kg
Benzo(a)pyrene	< 1500	1500	ug/kg
Benzo(b)fluoranthene	< 1500	1500	ug/kg
Benzo(ghi)Perylene	< 1500	1500	ug/kg
Benzo(k)fluoranthene	< 1500	1500	ug/kg
Chrysene	< 1500	1500	ug/kg
Dibenzo(a,h)anthracene	< 1500	1500	ug/kg
Fluoranthene	< 1500	1500	ug/kg
Fluorene	< 1500	1500	ug/kg
Indeno(1,2,3-cd)pyrene	< 1500	1500	ug/kg
2-Methylnaphthalene	< 1500	1500	ug/kg
Naphthalene	< 1500	1500	ug/kg
Phenanthrene	< 1500	1500	ug/kg
Pyrene	< 1500	1500	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**55.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**61.0**	23 - 120	
Terphenyl-d14 (surr.)	**62.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aroclor 1016	< 290	290	ug/kg
Aroclor 1221	< 290	290	ug/kg
Aroclor 1232	< 290	290	ug/kg
Aroclor 1242	< 290	290	ug/kg
Aroclor 1248	< 290	290	ug/kg
Aroclor 1254	< 290	290	ug/kg

Analyte	Result	PQL	Units

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Sample ID: 03-5523-008; 1L0331215S03

Aroclor 1260	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**81**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 29	29	ug/kg
Dieldrin	< 29	29	ug/kg
Chlordane(Total)	< 150	150	ug/kg
4,4'-DDT	< 29	29	ug/kg
4,4'-DDE	< 29	29	ug/kg
4,4'-DDD	< 29	29	ug/kg
Endosulfan I	< 29	29	ug/kg
Endosulfan II	< 29	29	ug/kg
alpha-BHC	< 29	29	ug/kg
beta-BHC	< 29	29	ug/kg
gamma-BHC (Lindane)	< 29	29	ug/kg
delta-BHC	< 29	29	ug/kg
Endosulfan sulfate	< 29	29	ug/kg
Endrin	< 29	29	ug/kg
Endrin aldehyde	< 29	29	ug/kg
Heptachlor	< 29	29	ug/kg
Heptachlor epoxide	< 29	29	ug/kg
Methoxychlor	< 29	29	ug/kg
Toxaphene	< 2900	2900	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**81.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**8820**	5880	ug/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 32 of 38

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Sample ID: 03-5523-008; 1L0331215S03

Analyte	Result	PQL	Units
Barium, Ba	**151000**	5880	ug/kg
Cadmium, Cd	**447**	294	ug/kg
Chromium, Cr	< 14700	14700	ug/kg
Lead, Pb	**19400**	5880	ug/kg
Selenium, Se	< 2940	2940	ug/kg
Silver, Ag	< 2940	2940	ug/kg
Copper, Cu	**12900**	5880	ug/kg
Zinc, Zn	**43500**	5880	ug/kg
Phosphorus, as P	**800000**	5880	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 590	590	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**670000**	118	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**115**	0.6	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**1300**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	**230**	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**20000**	5.9	mg/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 33 of 38

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Sample ID: 03-5523-008; 1L0331215S03

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**1400**	0.59	mg/kg

Sample ID: 03-5523-009; 1L0331215S04

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 12/30/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 480	480	ug/kg
Acenaphthylene	< 480	480	ug/kg
Anthracene	< 480	480	ug/kg
Benzo(a)anthracene	< 480	480	ug/kg
Benzo(a)pyrene	< 480	480	ug/kg
Benzo(b)fluoranthene	< 480	480	ug/kg
Benzo(ghi)Perylene	< 480	480	ug/kg
Benzo(k)fluoranthene	< 480	480	ug/kg
Chrysene	< 480	480	ug/kg
Dibenzo(a,h)anthracene	< 480	480	ug/kg
Fluoranthene	< 480	480	ug/kg
Fluorene	< 480	480	ug/kg
Indeno(1,2,3-cd)pyrene	< 480	480	ug/kg
2-Methylnaphthalene	< 480	480	ug/kg
Naphthalene	< 480	480	ug/kg
Phenanthrene	< 480	480	ug/kg
Pyrene	< 480	480	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**43.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**50.0**	23 - 120	
Terphenyl-d14 (surr.)	**47.0**	18 - 137	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aroclor 1016	< 96	96	ug/kg
Aroclor 1221	< 96	96	ug/kg
Aroclor 1232	< 96	96	ug/kg
Aroclor 1242	< 96	96	ug/kg
Aroclor 1248	< 96	96	ug/kg
Aroclor 1254	< 96	96	ug/kg

Client:	Environmental Consult. & Tech.	**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:** 03-5523-1	**Page:** Page 35 of 38

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Sample ID: 03-5523-009; 1L0331215S04

Analyte	Result	PQL	Units
Aroclor 1260	< 96	96	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**71**	30 - 115	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 12/29/03 **Analyzed by:** JG3

Aldrin	< 9.6	9.6	ug/kg
Dieldrin	< 9.6	9.6	ug/kg
Chlordane(Total)	< 48	48	ug/kg
4,4'-DDT	< 9.6	9.6	ug/kg
4,4'-DDE	< 9.6	9.6	ug/kg
4,4'-DDD	< 9.6	9.6	ug/kg
Endosulfan I	< 9.6	9.6	ug/kg
Endosulfan II	< 9.6	9.6	ug/kg
alpha-BHC	< 9.6	9.6	ug/kg
beta-BHC	< 9.6	9.6	ug/kg
gamma-BHC (Lindane)	< 9.6	9.6	ug/kg
delta-BHC	< 9.6	9.6	ug/kg
Endosulfan sulfate	< 9.6	9.6	ug/kg
Endrin	< 9.6	9.6	ug/kg
Endrin aldehyde	< 9.6	9.6	ug/kg
Heptachlor	< 9.6	9.6	ug/kg
Heptachlor epoxide	< 9.6	9.6	ug/kg
Methoxychlor	< 9.6	9.6	ug/kg
Toxaphene	< 960	960	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**71.0**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/23/03 **Date Analyzed:** 12/23/03 **Analyzed by:** AB2

Arsenic, As	**1920**	1920	ug/kg

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Sample ID: 03-5523-009; 1L0331215S04

Analyte	Result	PQL	Units
Barium, Ba	**156000**	1920	ug/kg
Cadmium, Cd	**142**	96.2	ug/kg
Chromium, Cr	< 4810	4810	ug/kg
Lead, Pb	< 1920	1920	ug/kg
Selenium, Se	< 962	962	ug/kg
Silver, Ag	< 962	962	ug/kg
Copper, Cu	< 1920	1920	ug/kg
Zinc, Zn	**7120**	1920	ug/kg
Phosphorus, as P	**30800**	1920	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 190	190	ug/kg

COD - Soil

Method(s): 410.4 **Date Analyzed:** 12/19/03 **Analyzed by:** SM

COD	**25000**	38	MG/KG

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 12/23/03 **Analyzed by:** SM

Carbon, Total Organic, TOC	**1.8**	0.2	%

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Oil/Grease	**70**	1.0	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 12/24/03 **Analyzed by:** SM

Oil/Grease	< 1.0	1.0	mg/kg

Nitrogen-Kjeldahl

Method(s): 351.3 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Nitrogen, Total Kjeldahl (TKN)	**700**	1.9	mg/kg

Client:	Environmental Consult. & Tech.			**RTI Project#:**	03-5523
Project:	LSCWQM, 03	**Report Number:**	03-5523-1	**Page:**	Page 37 of 38

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Sample ID: 03-5523-009; 1L0331215S04

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**52**	0.19	mg/kg

Notes:

E:	Exceedance of acceptable limit	**MDL:**	Method detection limit
mg/kg:	milligram per kilogram	**B:**	Analyte detected in both the sample and the Laboratory Method Blank
mg/L:	milligram per liter	**DIL:**	Diluted out (below level of detection)
ug/kg:	microgram per kilogram	**Q:**	Sample held beyond acceptable holding time
ug/L:	microgram per liter	**PQL:**	Practical quantitation level; lowest level of reportable detection for this sample
N/A:	Not applicable	**Y:**	The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate
ND:	None detected or less than PQL		
H:	result higher than the High Limit	**MI:**	Matrix interferences prevent accurate determination
L:	result lower than the Low Limit	**DUP:**	Values confirmed by duplicate analysis of sample

RTI LABORATORIES, INC.
Environmental, Chemical & Metallurgical Testing

Report of Analytical Services

Environmental Consult. & Tech
Attn: Karen Reaume
2250 Genoa Business Park Drive
Suite 130
Brighton, MI 48114

RTI Project#:	03-5622
Date Reported:	01/08/04
Date Completed:	01/08/04
Date Received:	12/24/03
PO #:	
Report Number: 03-5622-1	**Fax:** 810-494-5059

Project Title: COD, TOC, O&G, TPH, TKN, NH3, TP, Pesticide, 8082- PCB's, PNA, Metals
Project Description: 4 Sediment Samples
Project Name/#: Lake Orion; LSC W&MP
Project Remarks:

Sample Summary

	Sample ID	RTI Sample#	Sample Matrix	Date Collected
1	IL023122-S02	03-5622-001	Sediment	12/23/03
2	IL023122-S01	03-5622-002	Sediment	12/23/03
3	IL023122-S03	03-5622-003	Sediment	12/23/03
4	IL023122-SDUP	03-5622-004	Sediment	12/23/03

Approved by : _____ Date: _____

David Vesey, Laboratory Manager,Environmental

RESULTS OF ANALYSIS

Client:	Environmental Consult. & Tech			**RTI Project#:**	03-5622
Project:	Lake Orion, LSC W&MP	**Report Number:**	03-5622-1	**Page:**	Page 2 of 18

Sample ID: 03-5622-001; IL023122-S02

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 290	290	ug/kg
Acenaphthylene	< 290	290	ug/kg
Anthracene	< 290	290	ug/kg
Benzo(a)anthracene	< 290	290	ug/kg
Benzo(a)pyrene	< 290	290	ug/kg
Benzo(b)fluoranthene	< 290	290	ug/kg
Benzo(ghi)Perylene	< 290	290	ug/kg
Benzo(k)fluoranthene	< 290	290	ug/kg
Chrysene	< 290	290	ug/kg
Dibenzo(a,h)anthracene	< 290	290	ug/kg
Fluoranthene	< 290	290	ug/kg
Fluorene	< 290	290	ug/kg
Indeno(1,2,3-cd)pyrene	< 290	290	ug/kg
2-Methylnaphthalene	< 290	290	ug/kg
Naphthalene	< 290	290	ug/kg
Phenanthrene	< 290	290	ug/kg
Pyrene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**43.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**47.0**	23 - 120	
Terphenyl-d14 (surr.)	**32.0**	18 - 137	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Aldrin	< 12	12	ug/kg
Dieldrin	< 12	12	ug/kg
Chlordane(Total)	< 59	59	ug/kg
4,4'-DDT	< 12	12	ug/kg

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Sample ID: 03-5622-001; IL023122-S02

Analyte	Result	PQL	Units
4,4'-DDE	< 12	12	ug/kg
4,4'-DDD	< 12	12	ug/kg
Endosulfan I	< 12	12	ug/kg
Endosulfan II	< 12	12	ug/kg
alpha-BHC	< 12	12	ug/kg
beta-BHC	< 12	12	ug/kg
gamma-BHC (Lindane)	< 12	12	ug/kg
delta-BHC	< 12	12	ug/kg
Endosulfan sulfate	< 12	12	ug/kg
Endrin	< 12	12	ug/kg
Endrin aldehyde	< 12	12	ug/kg
Heptachlor	< 12	12	ug/kg
Heptachlor epoxide	< 12	12	ug/kg
Methoxychlor	< 12	12	ug/kg
Toxaphene	< 590	590	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**73.0**	30 - 115	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Aroclor 1016	< 120	120	ug/kg
Aroclor 1221	< 120	120	ug/kg
Aroclor 1232	< 120	120	ug/kg
Aroclor 1242	< 120	120	ug/kg
Aroclor 1248	< 120	120	ug/kg
Aroclor 1254	< 120	120	ug/kg
Aroclor 1260	< 120	120	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**73**	30 - 115	

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Sample ID: 03-5622-001; IL023122-S02

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Analyte	Result	PQL	Units
Arsenic, As	**3100**	1200	ug/kg
Barium, Ba	**20000**	1200	ug/kg
Cadmium, Cd	**120**	59	ug/kg
Chromium, Cr	**5800**	2900	ug/kg
Lead, Pb	**8500**	1200	ug/kg
Selenium, Se	< 590	590	ug/kg
Silver, Ag	< 590	590	ug/kg
Copper, Cu	**5100**	1200	ug/kg
Zinc, Zn	**19000**	1200	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Analyte	Result	PQL	Units
Mercury, Hg	< 120	120	ug/kg

Phosphorus

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Analyte	Result	PQL	Units
Phosphorus, P	**180**	15	mg/kg

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Carbon, Total Organic, TOC	**0.7**	0.1	%

COD - Soil

Method(s): 410.4 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
COD	**16000**	24	MG/KG

Nitrogen, Total Kjeldahl (TKN) - Soil

Method(s): 351.3 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Total Kjeldahl, TKN	**313**	1	MG/KG

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Nitrogen, Ammonia (as N)	**26**	0.12	mg/kg

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Sample ID: 03-5622-001; IL023122-S02

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	**24**	1.2	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	< 1.2	1.2	mg/kg

Sample ID: 03-5622-002; IL023122-S01

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 290	290	ug/kg
Acenaphthylene	< 290	290	ug/kg
Anthracene	< 290	290	ug/kg
Benzo(a)anthracene	< 290	290	ug/kg
Benzo(a)pyrene	< 290	290	ug/kg
Benzo(b)fluoranthene	< 290	290	ug/kg
Benzo(ghi)Perylene	< 290	290	ug/kg
Benzo(k)fluoranthene	< 290	290	ug/kg
Chrysene	< 290	290	ug/kg
Dibenzo(a,h)anthracene	< 290	290	ug/kg
Fluoranthene	< 290	290	ug/kg
Fluorene	< 290	290	ug/kg
Indeno(1,2,3-cd)pyrene	< 290	290	ug/kg
2-Methylnaphthalene	< 290	290	ug/kg
Naphthalene	< 290	290	ug/kg
Phenanthrene	< 290	290	ug/kg
Pyrene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**46.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**47.0**	23 - 120	
Terphenyl-d14 (surr.)	**53.0**	18 - 137	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aldrin	< 12	12	ug/kg
Dieldrin	< 12	12	ug/kg
Chlordane(Total)	< 59	59	ug/kg
4,4'-DDT	< 12	12	ug/kg
4,4'-DDE	< 12	12	ug/kg
4,4'-DDD	< 12	12	ug/kg

Client:	Environmental Consult. & Tech			**RTI Project#:**	03-5622
Project:	Lake Orion, LSC W&MP	**Report Number:**	03-5622-1	**Page:**	Page 7 of 18

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Sample ID: 03-5622-002; IL023122-S01

Analyte	Result	PQL	Units
Endosulfan I	< 12	12	ug/kg
Endosulfan II	< 12	12	ug/kg
alpha-BHC	< 12	12	ug/kg
beta-BHC	< 12	12	ug/kg
gamma-BHC (Lindane)	< 12	12	ug/kg
delta-BHC	< 12	12	ug/kg
Endosulfan sulfate	< 12	12	ug/kg
Endrin	< 12	12	ug/kg
Endrin aldehyde	< 12	12	ug/kg
Heptachlor	< 12	12	ug/kg
Heptachlor epoxide	< 12	12	ug/kg
Methoxychlor	< 12	12	ug/kg
Toxaphene	< 590	590	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**79.0**	30 - 115	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Aroclor 1016	< 120	120	ug/kg
Aroclor 1221	< 120	120	ug/kg
Aroclor 1232	< 120	120	ug/kg
Aroclor 1242	< 120	120	ug/kg
Aroclor 1248	< 120	120	ug/kg
Aroclor 1254	< 120	120	ug/kg
Aroclor 1260	< 120	120	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**79**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Arsenic, As	**4400**	1200	ug/kg

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Sample ID: 03-5622-002; IL023122-S01

Analyte	Result	PQL	Units
Barium, Ba	**14000**	1200	ug/kg
Cadmium, Cd	**96**	59	ug/kg
Chromium, Cr	**2900**	2900	ug/kg
Lead, Pb	**31000**	1200	ug/kg
Selenium, Se	< 590	590	ug/kg
Silver, Ag	< 590	590	ug/kg
Copper, Cu	**3500**	1200	ug/kg
Zinc, Zn	**21000**	1200	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 120	120	ug/kg

Phosphorus

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Phosphorus, P	**200**	15	mg/kg

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Carbon, Total Organic, TOC	**0.3**	0.1	%

COD - Soil

Method(s): 410.4 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

COD	**9300**	24	MG/KG

Nitrogen, Total Kjeldahl (TKN) - Soil

Method(s): 351.3 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Nitrogen, Total Kjeldahl, TKN	**116**	1	MG/KG

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Nitrogen, Ammonia (as N)	**12**	0.12	mg/kg

continued from previous page...

Sample ID: 03-5622-002; IL023122-S01

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	**47**	1.2	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	< 1.2	1.2	mg/kg

Sample ID: 03-5622-003; IL023122-S03

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 280	280	ug/kg
Acenaphthylene	< 280	280	ug/kg
Anthracene	< 280	280	ug/kg
Benzo(a)anthracene	< 280	280	ug/kg
Benzo(a)pyrene	< 280	280	ug/kg
Benzo(b)fluoranthene	< 280	280	ug/kg
Benzo(ghi)Perylene	< 280	280	ug/kg
Benzo(k)fluoranthene	< 280	280	ug/kg
Chrysene	< 280	280	ug/kg
Dibenzo(a,h)anthracene	< 280	280	ug/kg
Fluoranthene	< 280	280	ug/kg
Fluorene	< 280	280	ug/kg
Indeno(1,2,3-cd)pyrene	< 280	280	ug/kg
2-Methylnaphthalene	< 280	280	ug/kg
Naphthalene	< 280	280	ug/kg
Phenanthrene	< 280	280	ug/kg
Pyrene	< 280	280	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**37.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**43.0**	23 - 120	
Terphenyl-d14 (surr.)	**31.0**	18 - 137	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aldrin	< 11	11	ug/kg
Dieldrin	< 11	11	ug/kg
Chlordane(Total)	< 57	57	ug/kg
4,4'-DDT	< 11	11	ug/kg
4,4'-DDE	< 11	11	ug/kg
4,4'-DDD	< 11	11	ug/kg

continued from previous page...

Sample ID: 03-5622-003; IL023122-S03

Analyte	Result	PQL	Units
Endosulfan I	< 11	11	ug/kg
Endosulfan II	< 11	11	ug/kg
alpha-BHC	< 11	11	ug/kg
beta-BHC	< 11	11	ug/kg
gamma-BHC (Lindane)	< 11	11	ug/kg
delta-BHC	< 11	11	ug/kg
Endosulfan sulfate	< 11	11	ug/kg
Endrin	< 11	11	ug/kg
Endrin aldehyde	< 11	11	ug/kg
Heptachlor	< 11	11	ug/kg
Heptachlor epoxide	< 11	11	ug/kg
Methoxychlor	< 11	11	ug/kg
Toxaphene	< 570	570	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**60.0**	30 - 115	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Aroclor 1016	< 110	110	ug/kg
Aroclor 1221	< 110	110	ug/kg
Aroclor 1232	< 110	110	ug/kg
Aroclor 1242	< 110	110	ug/kg
Aroclor 1248	< 110	110	ug/kg
Aroclor 1254	< 110	110	ug/kg
Aroclor 1260	< 110	110	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**60**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Arsenic, As	**6100**	1100	ug/kg

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Sample ID: 03-5622-003; IL023122-S03

Analyte	Result	PQL	Units
Barium, Ba	**24000**	1100	ug/kg
Cadmium, Cd	**110**	57	ug/kg
Chromium, Cr	**10000**	2800	ug/kg
Lead, Pb	**9100**	1100	ug/kg
Selenium, Se	< 570	570	ug/kg
Silver, Ag	< 570	570	ug/kg
Copper, Cu	**9400**	1100	ug/kg
Zinc, Zn	**26000**	1100	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 110	110	ug/kg

Phosphorus

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Phosphorus, P	**240**	14	mg/kg

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Carbon, Total Organic, TOC	**0.3**	0.1	%

COD - Soil

Method(s): 410.4 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

COD	**7500**	23	MG/KG

Nitrogen, Total Kjeldahl (TKN) - Soil

Method(s): 351.3 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Nitrogen, Total Kjeldahl, TKN	**157**	1	MG/KG

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Nitrogen, Ammonia (as N)	**14**	0.11	mg/kg

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Sample ID: 03-5622-003; IL023122-S03

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	**34**	1.1	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	< 1.1	1.1	mg/kg

Sample ID: 03-5622-004; IL023122-SDUP

8270 PNA Soil

Method(s): 3545, 8270 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	< 290	290	ug/kg
Acenaphthylene	< 290	290	ug/kg
Anthracene	< 290	290	ug/kg
Benzo(a)anthracene	< 290	290	ug/kg
Benzo(a)pyrene	< 290	290	ug/kg
Benzo(b)fluoranthene	< 290	290	ug/kg
Benzo(ghi)Perylene	< 290	290	ug/kg
Benzo(k)fluoranthene	< 290	290	ug/kg
Chrysene	< 290	290	ug/kg
Dibenzo(a,h)anthracene	< 290	290	ug/kg
Fluoranthene	< 290	290	ug/kg
Fluorene	< 290	290	ug/kg
Indeno(1,2,3-cd)pyrene	< 290	290	ug/kg
2-Methylnaphthalene	< 290	290	ug/kg
Naphthalene	< 290	290	ug/kg
Phenanthrene	< 290	290	ug/kg
Pyrene	< 290	290	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**41.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**42.0**	23 - 120	
Terphenyl-d14 (surr.)	**47.0**	18 - 137	

Chlorinated Pesticides

Method(s): 3545, 8081 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Aldrin	< 12	12	ug/kg
Dieldrin	< 12	12	ug/kg
Chlordane(Total)	< 58	58	ug/kg
4,4'-DDT	< 12	12	ug/kg
4,4'-DDE	< 12	12	ug/kg
4,4'-DDD	< 12	12	ug/kg

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Sample ID: 03-5622-004; IL023122-SDUP

Analyte	Result	PQL	Units
Endosulfan I	< 12	12	ug/kg
Endosulfan II	< 12	12	ug/kg
alpha-BHC	< 12	12	ug/kg
beta-BHC	< 12	12	ug/kg
gamma-BHC (Lindane)	< 12	12	ug/kg
delta-BHC	< 12	12	ug/kg
Endosulfan sulfate	< 12	12	ug/kg
Endrin	< 12	12	ug/kg
Endrin aldehyde	< 12	12	ug/kg
Heptachlor	< 12	12	ug/kg
Heptachlor epoxide	< 12	12	ug/kg
Methoxychlor	< 12	12	ug/kg
Toxaphene	< 580	580	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**64.0**	30 - 115	

8082 Soil PCB

Method(s): 3545, 8082 **Date Analyzed:** 01/05/04 **Analyzed by:** JG3

Aroclor 1016	< 120	120	ug/kg
Aroclor 1221	< 120	120	ug/kg
Aroclor 1232	< 120	120	ug/kg
Aroclor 1242	< 120	120	ug/kg
Aroclor 1248	< 120	120	ug/kg
Aroclor 1254	< 120	120	ug/kg
Aroclor 1260	< 120	120	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	**64**	30 - 115	

Total Metals

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Arsenic, As	**4000**	1200	ug/kg

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Sample ID: 03-5622-004; IL023122-SDUP

Analyte	Result	PQL	Units
Barium, Ba	**11000**	1200	ug/kg
Cadmium, Cd	**76**	58	ug/kg
Chromium, Cr	**4300**	2900	ug/kg
Lead, Pb	**43000**	1200	ug/kg
Selenium, Se	< 580	580	ug/kg
Silver, Ag	< 580	580	ug/kg
Copper, Cu	**4500**	1200	ug/kg
Zinc, Zn	**18000**	1200	ug/kg

Mercury (Hg)

Method(s): 7471A **Date Analyzed:** 12/29/03 **Analyzed by:** SM

Mercury, Hg	< 120	120	ug/kg

Phosphorus

Method(s): 3050, 6020 **Date Prepared:** 12/29/03 **Date Analyzed:** 12/30/03 **Analyzed by:** AB2

Phosphorus, P	**100**	15	mg/kg

Walkley-Black TOC

Method(s): WB **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Carbon, Total Organic, TOC	**0.3**	0.1	%

COD - Soil

Method(s): 410.4 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

COD	**7600**	23	MG/KG

Nitrogen, Total Kjeldahl (TKN) - Soil

Method(s): 351.3 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Nitrogen, Total Kjeldahl, TKN	**112**	1	MG/KG

Nitrogen-Ammonia

Method(s): 350.2 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Nitrogen, Ammonia (as N)	**12**	0.12	mg/kg

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Sample ID: 03-5622-004; IL023122-SDUP

Oil & Grease (FOG-HEM)

Method(s): 3540C, 1664-HEM **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	**70**	1.2	mg/kg

Oil & Grease (FOG)

Method(s): 3540C, 1664 **Date Analyzed:** 01/07/04 **Analyzed by:** SM

Analyte	Result	PQL	Units
Oil/Grease	< 1.2	1.2	mg/kg

Notes:

E:	Exceedance of acceptable limit	**MDL:**	Method detection limit
mg/kg:	milligram per kilogram	**B:**	Analyte detected in both the sample and the Laboratory Method Blank
mg/L:	milligram per liter	**DIL:**	Diluted out (below level of detection)
ug/kg:	microgram per kilogram	**Q:**	Sample held beyond acceptable holding time
ug/L:	microgram per liter	**PQL:**	Practical quantitation level; lowest level of reportable detection for this sample
N/A:	Not applicable	**Y:**	The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate
ND:	None detected or less than PQL		
H:	result higher than the High Limit	**MI:**	Matrix interferences prevent accurate determination
L:	result lower than the Low Limit	**DUP:**	Values confirmed by duplicate analysis of sample

Appendix C

Results of Ten-Day *Hyalella azteca* and *Chironomus tentans* Toxicity Tests with Whole Sediments from Environmental Consulting & Technology (ECT) Samples Received March 31, 2004

Prepared by

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INTRODUCTION

At the request of Environmental Consulting and Technology (ECT), ASci-Environmental Testing Laboratory (ASci-ETL) performed toxicity tests with bulk sediment samples (LV-01, LV-02, SL-02, and SL-03) collected from natural waters in the state of Michigan. The 10-day tests were performed to measure the toxicity of selected sediment samples to *Hyalella azteca* (amphipod) and larval *Chironomus tentans* (midge). The *Hyalella* test endpoint was survival, and the *Chironomus* endpoints were survival and growth (dried and ash-free dried weight (AFDW)).

STUDY SUMMARY

The table below summarizes survival and growth (as weight) for the ECT sediments and the West Bearskin control. None of the ECT sediments caused statistically significant decreases in either organism survival or growth when compared to the West Bearskin reference control.

Endpoint	West Bearskin	LV-01	LV-02	SL-02	SL-03
H. azteca Survival (%)	98	94	93	94	95
C. tentans Survival (%)	98	89	88	99	93
C. tentans Dried Weight (mg/org)	1.09	1.48	1.51	1.64	2.22
C. tentans AFDW (mg/org)	0.82	1.19	1.11	1.04	1.15

METHODS AND MATERIALS

General Test Methods

Exposures to determine the toxicity of whole sediment samples from ECT were performed following suggested United States Environmental Protection Agency (USEPA)/USACE methods (USEPA/USACE 1998). Ten-day tests exposing *Hyalella* and *Chironomus* were conducted in a manner to determine the effect of each test sediment on organism survival and *Chironomus* growth. Effect was determined by comparison to organism performance following exposure to the selected reference site sediment. Exposure conditions were maintained using an intermittent flow system for renewal of overlying water. Following are detailed descriptions of test performance, test results, data reduction, and results interpretation.

Test Organism Culturing, Holding, and Acclimation

Hyalella and *Chironomus* were obtained from Environmental Consulting and Testing (ECT), Superior, Wisconsin. Culture conditions were maintained according to suggested EPA methods (EPA 2000). The *Hyalella* were cultured in a static-renewal system with overlying water renewed twice per week, and the *Chironomus* were cultured in a recirculating system. Culture temperature is maintained near the test temperature of 23°C.

The batches of test organisms were hand delivered to ASci-ETL. Upon arrival at ASci-ETL, the batches of organisms were logged in and quarantined in glass containers. Diets during holding were the same as used during the toxicity exposures. The organisms were not crowded or subjected to daily temperature changes greater than 3°C per day during holding. The holding tanks were lightly aerated during the pre-test period. At test initiation the *Hyalella* were 12 to 14 days old. The *Chironomus* were third instar larvae or younger.

Overlying Water Characteristics

Overlying water supplied to the test chambers was dechlorinated City of Duluth tap water. The City draws its water from Lake Superior. The tap water was dechlorinated and metals were removed with treatment through two, 1.5 cubic-foot activated carbon beds. The most recent chemical analyses of the post-carbon tap water are contained in Appendix D.

Exposure System

Sediment from each site tested included eight replicates for each species. Exposure chambers were 300-ml Berzilius® glass beakers with 1.5 cm diameter side-wall ports screened with a stainless steel mesh. The ports were located approximately 8 cm above the base of the beaker. The screens were fixed to the beakers using aquarium-grade silicone adhesive. Sixteen replicate test chambers (eight for each species) of each sediment exposure were held in a single all glass 15-L aquarium constructed with silicone adhesive. The 12-L aquaria were fitted with a self-starting siphon drain positioned 10 cm above the base of the tank and provided a water volume of 11 liters.

Dechlorinated tap water was fed to a 5-gallon stainless steel headbox where the water was heated and then aerated to reduce supersaturated levels of dissolved gasses. The water was gravity fed to an intermediate polyethylene delivery tank. The intermediate tank contained a submersible pump controlled by a timer. The timer was set to activate the pump at 4-hour intervals (6 times per day). The pump was activated for 5 minutes to deliver an appropriate volume of overlying water to the test system. This volume was rapidly pumped to splitter tubes that delivered fresh overlying water to each holding aquarium. The configuration resulted in two turnovers of overlying water per day. Test temperature (23° ± 1°C) was maintained using a constant temperature water bath.

Test photoperiod was maintained at 16 hours light and 8 hours darkness per day. Light was supplied by cool-white fluorescent bulbs at an intensity of 50 to 100 ft-candles.

Test Performance

Sediment samples were collected by ECT personnel December 13,2003 through January 22, 2004. The samples were delivered to ASci-ETL by express courier on March 31, 2004. The samples were labeled as LV-01, LV-02, SL-02, and SL-03. The Chain of Custody forms were completed upon the samples' arrival. Sample log-in included visual inspection of the shipping coolers, sample container integrity, sediment temperature and appearance. Following log-in procedures, the samples were stored in darkness at 1-4°C until use. Appendix A contains a copy of the Chain of Custody forms.

Laboratory control sediment was collected on July 7, 2003, from West Bearskin Lake, located in Cook County, Minnesota. The sediment sample (5-gallon) was placed in two new polyethylene containers and cooled immediately. Upon arrival at the laboratory, the sample was logged-in and stored under refrigeration (1-4°C) until use. Before use in the tests, the laboratory control sediment was thoroughly homogenized, then sieved through a 2-mm screen to remove indigenous organisms.

The toxicity exposures with both test species were performed simultaneously. Twenty-four hours before toxicity test initiation each sample was thoroughly homogenized with a stainless steel auger, and 100-ml portions were transferred to each of the 16 designated replicate exposure chambers. Each set of replicate test chambers were then placed into an assigned 15-L holding chamber containing 11 L of overlying water. The toxicity tests were initiated approximately 24 hours later, after the sediments were allowed to settle. The organisms were introduced into the test system on April 2, 2004.

To start the tests, ten *Hyalella* (12 to 14 days old), and ten *Chironomus* (third instar or younger) were impartially distributed to designated intermediate holding cups. The organisms were handled with a wide-bore glass pipette. The organisms were then transferred from the intermediate vessels to an assigned test replicate.

At test initiation and each daily observation, head flow rate was measured, and any flows found to be outside the range of ± 10% from target flow were adjusted. Measurements of overlying water pH, total ammonia, conductivity, hardness, and alkalinity were performed on day 0 and day 10. The temperature and dissolved oxygen were measured daily. The total residual chlorine concentration of the post-carbon water was measured periodically during the test to check for breakthrough.

The test organisms were fed a diet based on EPA methods and recommendations from the culturing laboratory (Aquatic Biosystems). The *Hyalella* were fed a mixture of yeast, Cerophyl®, and fermented trout chow (YCT) prepared to contain 1,800 mg/L total solids. *Chironomus* test chambers received a Tetrafin® slurry. The slurry was prepared to contain 4 g/L total solids. Each *Chironomus* test replicate received 1.5 ml of Tetrafin® slurry daily, and each *Hyalella* test replicate received 1.0 ml of YCT daily.

The tests were terminated following 10 days of exposure. Any organisms in the overlying water were removed first. The sediments were then removed from the test chambers in a layered fashion using a gentle stream of post-carbon treated water. The sediments were collected in a US Standard #40 sieve. The contents retained on the sieve were rinsed into a white polyethylene pan, placed on a light source, and the sieved contents were searched for test organisms. Numbers of live organisms and dead organisms found were counted and recorded. Organisms not found were recorded as dead. These organisms were assumed to have died early in the exposures and the remains had decayed.

The live *Chironomus* from each replicate were pooled, rinsed, and placed in pre-ashed, pre-weighed aluminum weigh boats. The organisms pooled from each individual test replicate were then dried at 96°C for 23 hours. The dried, pooled organisms were then weighed to the nearest 0.01 mg to determine mean dried weights. Organisms were then ashed at 550°C for two hours, and then weighed to determine ash-free dry weight (AFDW). AFDW equals the weight of dried larvae minus weight of ashed larvae.

Any pupae that were recovered were included in survival measurements but not growth measurements. For replicates found to contain pupae, the mean weight was calculated by dividing the pooled dry weight of the replicate by the number of organisms exposed less the number of pupae recovered.

Treatment of Results

The cumulative number of surviving organisms for each test sediment exposure was compared to cumulative survival of organisms exposed to the selected reference site sediment exposure to measure effect. The survival data were analyzed using the TOXSTAT Version 3.5 software package (West Inc., and University of Wyoming, Laramie, Wyoming). The survival data were arc-sine transformed before analysis then checked for normality and equality of variance. The appropriate parametric or non-parametric test was then performed to determine significant effect ($p=0.05$) as compared to the reference site results.

The growth data was not formally analyzed due to the obvious lack of effect. All test sediments had mean dried weights and ash-free dry weights greater than that of the reference control.

RESULTS

Overlying Water Characteristics

Headbox flow rates were measured daily. The daily values, calculated test chamber flow rates, and volume exchanges are in Table 1. The overall mean flow rate for each of the holding tanks during the test period was 9.2-9.4 ml/minute. The mean flow rate shows overlying water was renewed at a rate that averaged 2.0 tank volumes per day.

Tables 2 and 3 summarize the overlying water temperature values measured daily from the *Hyalella* and *Chironomus* exposure chambers. The range of individual temperature values was from 22.0°C to 23.2°C. All the individual values were within the proposed range of 23°C ± 1°C. Mean test temperatures were maintained at 22.8 to 22.9°C.

Overlying water dissolved oxygen (DO) concentrations in the *Hyalella* and *Chironomus* test chambers are in Tables 4 and 5. DO values ranged from 6.2 to 8.4 mg/L during the *Hyalella* exposures. The percentage of dissolved oxygen saturation ranged from 72% to 98%. At no time was feeding suspended for the *Hyalella* exposures. DO values ranged from 4.0 to 8.4 mg/L during the *Chironomus* exposures. The percentage of dissolved oxygen saturation ranged from 47% to 98%. At no time was feeding suspended for the *Chironomus* exposures. Research cited in the USEPA 2000 sediment manual indicates *Chironomus* and *Hyalella* are not affected by oxygen depletion until DO levels drop below 2.5 mg/L.

Overlying water pHs for the *Hyalella* and *Chironomus* test chambers are in Tables 6 and 7. The pH of overlying water in the *Hyalella* and *Chironomus* exposures ranged from 7.53 to 7.96. None of the pH values were outside of the organism's physiologically tolerable range.

Tables 8 and 9 contain the overlying water conductivity values for the *Hyalella* and *Chironomus* exposures. The overall range of conductivity values for both exposures was from 126 μmhos/cm to 402 μmhos/cm. None of the values indicated that a significant amount of ionized material was released from the test sediments.

Tables 10 and 11 contain overlying water alkalinity values for the *Hyalella* and *Chironomus* exposures, respectively. Concentrations ranged from 18 mg/L to 192 mg/L as $CaCO_3$.

Tables 12 and 13 contain the overlying total hardness values for the exposures. Concentrations ranged from 42 mg/L to 186 mg/L as $CaCO_3$.

Tables 14 and 15 contain the results of total ammonia measurements for the exposures. Ammonia measurements ranged from <1.0 to 3.7 mg/L.

The routine chemistry values indicated the test system maintained suitable water quality to allow assessment of sediment toxicity for both test species. The levels of ammonia measured throughout the test, when compared to the corresponding pH levels, should not have caused toxicity to either test species.

Biological Exposure Results

All organisms were initially observed to burrow into all test sediments. Normal levels of organism activity were observed throughout the test.

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Hyalella azteca Survival -

Table 16 summarizes the *Hyalella* survival results for the 10-day exposures. The laboratory control sediments (West Bearskin) supported acceptable 10-day mean survival of 98 ± 5%. The test sediments had survival rates ranging from 93% to 95%.

Chironomus tentans Survival and Growth Results -

Table 16 summarizes the *Chironomus* survival results for the 10-day exposures. The laboratory control sediments (West Bearskin) supported acceptable 10-day mean survival of 98 ± 5%. The test sediments had survival rates ranging from 88% to 99%.

Chironomus dried weight results are given in Table 16. Final mean dry weight for organisms exposed to the laboratory control sediment was an acceptable 1.09 ± 0.12 mg/organism. The organisms in the test sediments had dried weights ranging from 1.48-2.22 mg/organism.

Chironomus ash-free dry weight results are given in Table 16. Final mean ash-free dry weight for organisms exposed to the laboratory control sediment was an acceptable 0.82 ± 0.10 mg/organism. The organisms in the test sediments had dried weights ranging from 1.04-1.19 mg/organism.

Hyalella azteca Statistical Results -

Survival Analysis - The *Hyalella* survival data for the management units were compared to the West Bearskin sediment to measure effect. The data for the comparisons were non-normal and homogeneous, therefore, a Steel's test was the appropriate analysis. Results of the analysis showed that none of the test sediments caused significant ($p=0.05$) organism lethality when compared to the lake reference sediment results. Printouts of the analysis are contained in Appendix C.

Chironomus tentans Statistical Results -

Survival Analysis - The *Chironomus* survival data for the management units were compared to the West Bearskin sediment to measure effect. The data for the comparisons were non-normal and homogeneous, therefore, a Steel's test was the appropriate analysis. Results of the analysis showed that none of the test sediments caused significant ($p=0.05$) organism lethality when compared to the lake reference sediment results. Printouts of the analysis are contained in Appendix C.

Dried Weight and Ash-free Dried Weight Analysis – The dried weight and ash-free dried weight data were not formally analyzed due to the obvious lack of effect. Mean dried and ash-free dried weights for *Chironomus* exposed to all test sediments was higher than the reference control results.

CONCLUSIONS

The following conclusions can be drawn from the study results.

- The laboratory control sediment used for this study supported acceptable organism survival for both test species and acceptable *Chironomus* growth.

- None of the test sediments collected by ECT personnel caused significant organism mortality for either species or reductions in *Chironomus* growth.

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Mary K. Shubauer-Berigan, Philip D. Monson, Corlis W. West, and Gerald T. Ankley. Influence of pH on the Toxicity of Ammonia to *Chironomus tentans* and *Lumbriculus variegatus*. Environmental Toxicology and Chemistry, Vol. 14, No. 4, pp.713-717, 1995.

TABLE 1. Flow Rates (ml/min) of Overlying Water and Daily Turnover Rates to ECT Sediments Test Chambers During Ten-Day *Hyalella* and *Chironomus* Exposures

	Test Day													
	0	1	2	3	4	5	6	7	8	9	10	Mean	low	high
Head Flow Rate	320	320	316	320	320	312	316	320	316	320	320	318	312	320
Test Chamber Flow Rate	9.4	9.4	9.3	9.4	9.4	9.2	9.3	9.4	9.3	9.4	9.4	9.4	9.2	9.4
Volume Exchanges	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0

Table 2. **Overlying Water Temperature Values (oC) for ECT Sediments During Ten-Day Hyalella Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	22.6	22.7	22.8	22.6	22.7
1	22.8	22.9	23.0	23.0	22.8
2	22.7	22.7	22.7	23.0	22.9
3	22.1	22.1	22.0	22.1	22.1
4	23.0	23.0	23.0	23.0	23.0
5	23.2	23.2	23.1	23.0	23.2
6	23.0	23.1	23.0	23.2	23.2
7	22.9	22.8	22.8	22.8	22.9
8	22.8	23.0	23.0	22.9	22.9
9	23.0	23.0	23..0	23.1	23.1
10	23.1	22.9	23.1	22.9	23.1
Low	22.1	22.1	22.0	22.1	22.1
High	23.2	23.2	23.1	23.2	23.2
Mean	22.8	22.9	22.9	22.9	22.9

Table 3. **Overlying Water Temperature Values (oC) for Oswego Sediments During Ten-Day Chironomus Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	22.6	22.7	22.8	22.6	22.7
1	22.8	22.9	23.0	23.0	22.8
2	22.7	22.7	22.7	23.0	22.9
3	22.1	22.1	22.0	22.1	22.1
4	23.0	23.0	23.0	23.0	23.0
5	23.2	23.2	23.1	23.0	23.2
6	23.0	23.1	23.0	23.2	23.2
7	22.9	22.8	22.8	22.8	22.9
8	22.8	23.0	23.0	22.9	22.9
9	23.0	23.0	23.0	23.1	23.1
10	23.1	23.2	23.1	23.2	23.0
Low	22.1	22.1	22.0	22.1	22.1
High	23.2	23.2	23.1	23.2	23.2
Mean	22.8	22.9	22.9	22.9	22.9

Table 4. **Overlying Water Dissolved Oxygen Values (mg/L) for ECT Sediments During Ten-Day Hyalella Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	8.2	8.4	8.4	8.4	8.3
1	6.6	6.5	6.9	7.0	7.2
2	7.5	6.7	6.7	6.9	7.0
3	8.1	6.9	8.0	8.1	8.0
4	8.1	7.7	7.7	8.2	8.2
5	7.5	6.2	6.8	7.4	7.6
6	7.9	6.9	7.3	7.2	7.7
7	8.1	6.6	7.1	7.4	7.5
8	7.5	7.0	7.0	7.1	7.2
9	7.8	8.0	7.7	7.8	7.8
10	7.3	7.8	7.4	7.3	7.6
Low	6.6	6.2	6.7	6.9	7.0
High	8.2	8.4	8.4	8.4	8.3
Mean	7.7	7.2	7.4	7.5	7.6

Table 5. **Overlying Water Dissolved Oxygen Values (mg/L) for ECT Sediments During Ten-Day Chironomus Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	8.2	8.4	8.4	8.4	8.3
1	7.0	6.1	5.8	5.9	6.5
2	6.0	5.2	5.4	5.7	6.0
3	7.4	7.7	7.7	6.7	6.6
4	6.8	6.6	6.6	6.9	6.5
5	7.5	4.0	4.0	4.8	6.3
6	8.0	6.5	5.7	5.7	5.2
7	7.9	6.6	6.7	6.7	7.5
8	8.0	6.7	6.7	6.6	6.8
9	8.0	8.0	8.0	7.8	7.8
10	7.8	7.6	7.5	7.8	7.1
Low	6.0	4.0	4.0	4.8	5.2
High	8.2	8.4	8.4	8.4	8.3
Mean	7.5	6.7	6.6	6.6	6.8

Table 6. **Overlying Water pH Values for ECT Sediments During Ten-Day *Hyalella* Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	7.53	7.72	7.77	7.62	7.96
10	7.58	7.69	7.73	7.61	7.63

Table 7. **Overlying Water pH Values for ECT Sediments During Ten-Day *Chironomus* Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	7.53	7.72	7.77	7.62	7.96
10	7.68	7.75	7.68	7.61	7.81

Table 8. **Overlying Water Conductivity Values (umhos/cm) for ECT Sediments During Ten-Day Hyalella Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	126	212	238	402	218
10	129	232	254	236	215

Table 9. **Overlying Water Conductivity Values (umhos/cm) for ECT Sediments During Ten-Day Chironomus Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	126	212	238	402	218
10	130	236	248	231	220

Table 10. **Overlying Water Alkalinity Values (mg/L) for ECT Sediments During Ten-Day Hyalella Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	18	108	164	188	130
10	28	110	150	192	100

Table 11. Overlying Water Alkalinity Values (mg/L) for ECT Sediments During Ten-Day Chironomus Exposures

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	18	108	164	188	130
10	42	112	160	168	120

Table 12. Overlying Water Hardness Values (mg/L) for ECT Sediments During Ten-Day Hyalella Exposures

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	84	120	152	166	118
10	42	114	160	146	128

Table 13. **Overlying Water Hardness Values (mg/L) for ECT Sediments During Ten-Day Chironomus Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	84	120	152	166	118
10	40	120	158	150	130

Table 14. **Overlying Water Ammonia Values (mg/L) for ECT Sediments During Ten-Day Hyalella Exposures**

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	<1	2.0	3.7	3.6	2.1
10	<1	<1	1.3	<1	<1

Table 15. Overlying Water Ammonia Values (mg/L) for ECT Sediments During Ten-Day Chironomus Exposures

Day	West Bearskin	LV-01	LV-02	SL-02	SL-03
0	<1	2.0	3.7	3.6	2.1
10	<1	1.1	1	<1	<1

Table 16. *C. tentans* Survival and Growth and *H. azteca* Survival

Chironomus tentans 10-day Survival and Growth Data

Site ID # West Bearskin

Rep	# Organisms			Dried Pan Wt. (g)	Dried Pan + Dried Org. Wt. (g)	Ashed Pan Weight (g)	Ashed Pan + Ashed Org. Wt. (g)	Dried Org. Wt. (g)	Ashed Org. Wt. (g)	Mean Dried Weight (mg)	Mean Ashed Weight (mg)
	Alive	Dead	Weighed								
A	10	0	10	1.27746	1.28684	1.25060	1.25306	0.00938	0.00246	0.94	0.69
B	10	0	10	1.26731	1.27654	1.26558	1.26799	0.00923	0.00241	0.92	0.68
C	10	0	10	1.27202	1.28340	1.25795	1.26084	0.01138	0.00289	1.14	0.85
D	10	0	10	1.27541	1.28579	1.26067	1.26339	0.01038	0.00272	1.04	0.77
E	10	0	10	1.27352	1.28464	1.25779	1.26025	0.01112	0.00246	1.11	0.86
F	9	1	9	1.27636	1.28742	1.25453	1.25721	0.01106	0.00268	1.23	0.93
G	10	0	10	1.26498	1.27684	1.26418	1.26694	0.01186	0.00276	1.19	0.91
H	9	1	9	1.26141	1.27205	1.24802	1.25060	0.01064	0.00258	1.18	0.89
Mean	9.8								Mean	1.09	0.82
St.Dev	0.5								St.Dev	0.12	0.10

Hyalella azteca 10-day Survival

Site ID # West Bearskin

Rep	# Organisms	
	Alive	Dead
A	10	0
B	9	1
C	10	0
D	10	0
E	10	0
F	10	0
G	9	1
H	10	0
Mean	9.8	
St.Dev	0.5	

Table 16. *C. tentans* Survival and Growth and *H. azteca* Survival

Chironomus tentans 10-day Survival and Growth Data

Site ID # LV-01

Rep	# Organisms			Dried Pan Wt. (g)	Dried Pan + Dried Org. Wt. (g)	Ashed Pan Weight (g)	Ashed Pan + Ashed Org. Wt. (g)	Dried Org Wt. (g)	Ashed Org Wt. (g)	Mean Dried Weight (mg)	Mean Ashed Weight (mg)
	Alive	Dead	Weighed								
A	9	1	9	1.27312	1.28789	1.25498	1.25800	0.01477	0.00302	1.64	1.30
B	9	1	9	1.27349	1.28618	1.26783	1.27035	0.01269	0.00252	1.41	1.13
C	10	0	10	1.25827	1.26955	1.26801	1.27007	0.01128	0.00206	1.13	0.92
D	6	4	6	1.25433	1.26401	1.26508	1.26707	0.00968	0.00199	1.61	1.28
E	10	0	10	1.26668	1.28048	1.24426	1.24688	0.01380	0.00262	1.38	1.12
F	9	1	9	1.26616	1.28061	1.25890	1.26214	0.01445	0.00324	1.61	1.25
G	8	2	8	1.25057	1.26307	1.29723	1.29943	0.01250	0.00220	1.56	1.29
H	10	0	10	1.27477	1.29008	1.26021	1.26325	0.01531	0.00304	1.53	1.23
Mean	8.9								Mean	1.48	1.19
St.Dev	1.4								St.Dev	0.17	0.13

Hyalella azteca 10-day Survival

Site ID # LV-01

Rep	# Organisms	
	Alive	Dead
A	8	2
B	10	0
C	9	1
D	10	0
E	10	0
F	10	0
G	10	0
H	8	2
Mean	9.4	
St.Dev	0.9	

Table 16. *C. tentans* Survival and Growth and *H. azteca* Survival

Chironomus tentans 10-day Survival and Growth Data

Site ID # LV-02

Rep	# Organisms			Dried Pan Wt. (g)	Dried Pan + Dried Org. Wt. (g)	Ashed Pan Weight (g)	Ashed Pan + Ashed Org. Wt. (g)	Dried Org. Wt. (g)	Ashed Org. Wt. (g)	Mean Dried Weight (mg)	Mean Ashed Weight (mg)
	Alive	Dead	Weighed								
A	8	2	8	1.27470	1.29054	1.26846	1.27269	0.01584	0.00423	1.98	1.45
B	10	0	10	1.25410	1.26784	1.25596	1.25916	0.01374	0.00320	1.37	1.05
C	10	0	10	1.26060	1.27435	1.25907	1.26250	0.01375	0.00343	1.38	1.04
D	9	1	9	1.27019	1.28453	1.25487	1.25880	0.01434	0.00393	1.59	1.15
E	9	1	9	1.26574	1.28214	1.26920	1.27383	0.01640	0.00463	1.82	1.31
F	9	1	9	1.25495	1.26958	1.29280	1.29714	0.01463	0.00434	1.63	1.15
G	10	0	10	1.27639	1.29235	1.24753	1.25191	0.01596	0.00438	1.60	1.16
H	5	5	5	1.25879	1.26219	1.26053	1.26096	0.00340	0.00043	0.68	0.59
Mean	8.8								Mean	1.51	1.11
St.Dev	1.7								St.Dev	0.39	0.25

Hyalella azteca 10-day Survival

Site ID # LV-02

Rep	# Organisms	
	Alive	Dead
A	9	1
B	7	3
C	9	1
D	10	0
E	10	0
F	9	1
G	10	0
H	10	0
Mean	9.3	
St.Dev	1.0	

Table 16. *C. tentans* Survival and Growth and *H. azteca* Survival

Chironomus tentans 10-day Survival and Growth Data

Site ID # SL-02

Rep	# Organisms			Dried Pan Wt. (g)	Dried Pan + Dried Org. Wt. (g)	Ashed Pan Weight (g)	Ashed Pan + Ashed Org. Wt. (g)	Dried Org Wt. (g)	Ashed Org. Wt. (g)	Mean Dried Weight (mg)	Mean Ashed Weight (mg)
	Alive	Dead	Weighed								
A	10	0	10	1.26257	1.28093	1.26000	1.26642	0.01836	0.00642	1.84	1.20
B	10	0	10	1.27587	1.29074	1.25670	1.26308	0.01487	0.00638	1.49	0.85
C	10	0	10	1.27084	1.28997	1.24821	1.25545	0.01913	0.00724	1.91	1.19
D	10	0	10	1.27218	1.28523	1.25841	1.26313	0.01305	0.00472	1.31	0.84
E	9	1	9	1.26871	1.28200	1.26313	1.26798	0.01329	0.00485	1.48	0.94
F	10	0	10	1.26142	1.27701	1.26562	1.27068	0.01559	0.00506	1.56	1.05
G	10	0	10	1.25806	1.27483	1.28082	1.28636	0.01677	0.00554	1.68	1.13
H	10	0	10	1.27280	1.29099	1.25698	1.26400	0.01819	0.00702	1.82	1.12
Mean	9.9								Mean	1.64	1.04
St.Dev	0.4								St.Dev	0.21	0.15

Hyalella azteca 10-day Survival

Site ID # SL-02

Rep	# Organisms	
	Alive	Dead
A	10	0
B	9	1
C	9	1
D	8	2
E	10	0
F	9	1
G	10	0
H	10	0
Mean	9.4	
St.Dev	0.7	

Table 16. *C. tentans* Survival and Growth and *H. azteca* Survival

Chironomus tentans 10-day Survival and Growth Data

Site ID # SL-03

Rep	# Organisms			Dried Pan Wt. (g)	Dried Pan + Dried Org. Wt. (g)	Ashed Pan Weight (g)	Ashed Pan + Ashed Org. Wt. (g)	Dried Org Wt. (g)	Ashed Org. Wt. (g)	Mean Dried Weight (mg)	Mean Ashed Weight (mg)
	Alive	Dead	Weighed								
A	10	0	10	1.27553	1.29705	1.25767	1.26840	0.02152	0.01073	2.15	1.08
B	10	0	10	1.25807	1.28002	1.26877	1.27915	0.02195	0.01038	2.19	1.15
C	10	0	10	1.26229	1.28261	1.25634	1.26519	0.02032	0.00885	2.03	1.14
D	9	1	9	1.26551	1.28497	1.25359	1.26214	0.01946	0.00855	2.16	1.21
E	9	1	9	1.26296	1.28759	1.26154	1.27607	0.02463	0.01453	2.74	1.13
F	8	2	8	1.25892	1.27870	1.25784	1.26678	0.01978	0.00894	2.47	1.35
G	9	1	9	1.25887	1.27924	1.25699	1.26684	0.02037	0.00985	2.26	1.17
H	9	1	9	1.25498	1.27109	1.25485	1.26215	0.01611	0.00730	1.79	0.98
Mean	9.3								Mean	2.22	1.15
St.Dev	0.7								St.Dev	0.28	0.11

Hyalella azteca 10-day Survival

Site ID # SL-03

Rep	# Organisms	
	Alive	Dead
A	9	1
B	8	2
C	10	0
D	10	0
E	10	0
F	10	0
G	10	0
H	9	1
Mean	9.5	
St.Dev	0.8	

Table 17 . Precision of *Chironomus tentans* 96 Hour NaCl Reference Toxicant Testing

DATE	LC_{50} (g/l) [a]	Mean [b]	S_x [c]	CV (%) [d]
July, 2001	7.08	-	-	-
August, 2001	8.00	7.54	0.65	8.6
September, 2001	8.57	7.88	0.75	9.5
October, 2001	6.96	7.65	0.77	10.0
March, 2002	7.46	7.61	0.67	8.8
May, 2002	7.46	7.59	0.60	8.0
June, 2002	8.00	7.65	0.57	7.5
July, 2002	6.50	7.50	0.67	8.9
August, 2002	6.50	7.39	0.71	9.6
September, 2002	7.46	7.40	0.67	9.0
October, 2002	5.66	7.24	0.82	11.4
November, 2002	5.66	7.11	0.91	12.8
December, 2002	6.96	7.10	0.87	12.3
December, 2003	7.46	7.12	0.84	11.8
January, 2003	6.50	7.08	0.83	11.7
April, 2003	6.96	7.07	0.80	11.3
July, 2003	7.46	7.10	0.78	11.0
August, 2003	5.66	7.02	0.83	11.8
April, 2004	9.85	7.17	1.04	14.4
April, 2004	5.66	7.09	1.06	15.0

[a] Concentration (g/l) of NaCl which causes 50% lethality.

[b] Running mean.

[c] Standard deviation.

[d] Coefficient of variation.

Table 18 . Precision of *Hyalella azteca* 96 Hour NaCl Reference Toxicant Testing

DATE	LC_{50} (g/l) [a]	Mean [b]	S_x [c]	CV (%) [d]
August, 2001	2.83	-	-	-
September, 2001	2.46	2.65	0.26	9.9
October, 2001	2.46	2.58	0.21	8.3
November, 2001	2.64	2.60	0.18	6.8
December, 2001	3.25	2.73	0.33	12.1
March, 2002	3.73	2.90	0.50	17.4
May, 2002	3.01	2.91	0.46	15.9
June, 2002	3.25	2.95	0.44	15.1
July, 2002	2.83	2.94	0.42	14.2
August, 2002	2.83	2.93	0.40	13.5
September, 2002	2.46	2.89	0.40	13.9
October, 2002	2.83	2.88	0.38	13.3
December, 2002	2.29	2.84	0.40	14.2
December, 2003	2.46	2.81	0.40	14.2
January, 2003	2.46	2.79	0.40	14.2
April, 2003	2.83	2.79	0.38	13.7
July, 2003	2.14	2.75	0.40	14.6
August, 2003	2.83	2.76	0.39	14.2
January, 2004	2.14	2.72	0.40	14.9
April, 2004	2.83	2.73	0.39	14.5

[a] Concentration (g/l) of NaCl which causes 50% lethality.

[b] Running mean.

[c] Standard deviation.

[d] Coefficient of variation.

APPENDIX A

Chain of Custody Form

719 Griswold St., Suite 520
Detroit, MI 48226
(313) 963-6600
(313) 963-1707 - Fax

ECT
Environmental Consulting & Technology, Inc.

www.ectinc.com

CHAIN-OF-CUSTODY RECORD

PROJECT NUMBER (INCLUDE TASK NUMBER): 030397-0200

PROJECT NAME/LOCATION: Macomb County Monitoring

SAMPLER(S) NAME(S): John Kennedy, M. McGahey, J. Edwards

PRESERVATIVES: None

ANALYSES REQUESTED: H. Aztecs 10-day; C. tentans 10-day

DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	MATRIX	CONTAINERS NO.	CONTAINERS SIZE	REMARKS
1/22/04	1235		X	LV01	Sediment	1		
1/22/04	1330		X	LV02	↓	1		
12/13/03	1250		X	SL02		1		
12/13/03	1330		X	SL03	↓	1		

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
John Kennedy	3/30/04	1640		3/31/04	1510
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED AT LAB BY:	DATE:	TIME:

LABORATORY: ASCI Corporation

Report and Original COC to:
Mark Mikesell

ATTN:

Date Results Required:
NORMAL

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APPENDIX B

Raw Data Sheets

ECT

***Hyalella/Chironomus* Toxicity Test**

Study I.D. # 5010-215

Init. 4/2/04

Exposure System Observations/Activities Sheet for Sediments Initiated 4/2/04

Date	Day of Test	Observations/Activities	Initials	Observations
4/1/04	-1	Head Flow (ml/min): 316	CIA	SEDIMENTS LOADED.
4/2/04	0	Head Flow (ml/min): 320	CA	ORGANISMS LOADED, FED
4/3/04	1	Head Flow (ml/min): 320	CA	ALL SITES LOOK GOOD, FED
4/4/04	2	Head Flow (ml/min): 316	CIA	LOOKS GOOD. FED
4/5/04	3	Head Flow (ml/min): 320	NL	Looks Good. Fed
4/6/04	4	Head Flow (ml/min): 320	NL	Looks Good. Fed
4/7/04	5	Head Flow (ml/min): 312	NL	Looks Good. Fed.
4/8/04	6	Head Flow (ml/min): 316	NL	Looks Good. Fed
4/9/04	7	Head Flow (ml/min): 320	NL	Looks Good. Fed.
4/10/04	8	Head Flow (ml/min): 316	CA	Looks good. Fed
4/11/04	9	Head Flow (ml/min): 320	NL	Looks good. Fed.
4/12/04	10	Head Flow (ml/min): 320	VL	Looks good - terminated test 96 hrs @ CT @ for 23 hours, then ashed @ 550°C for 2 hrs

Table 2. Overlying Water Temperature Values (oC) for ECT Sediments During 10-Day Hyalella Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	22.6	22.7	22.8	22.6	22.7
1	22.8	22.9	23.0	23.0	22.8
2	22.7	22.7	22.7	23.0	22.9
3	22.1	22.1	22.0	22.1	22.1
4	23.0	23.0	23.0	23.0	23.0
5	23.2	23.2	23.1	23.0	23.2
6	23.0	23.1	23.0	23.2	23.2
7	22.9	22.8	22.8	22.8	22.9
8	22.8	23.0	23.0	22.9	22.9
9	23.0	23.0	23.0	23.1	23.1
10	23.1	22.9	23.1	22.9	23.1

Table 3. **Overlying Water Temperature Values (oC) for ECT Sediments During 10-Day Chironomus Exposures**

Day	West Bearskin	LV01	LV02	SL02	SL03
0	22.6	22.7	22.8	22.6	22.7
1	22.8	22.9	23.0	23.0	22.8
2	22.7	22.7	22.7	23.0	22.9
3	22.1	22.1	22.0	22.1	22.1
4	23.0	23.0	23.0	23.0	23.0
5	23.2	23.2	23.1	23.0	23.2
6	23.0	23.1	23.0	23.2	23.2
7	22.9	22.8	22.8	22.8	22.9
8	22.8	23.0	23.0	22.9	22.9
9	23.0	23.0	23.0	23.1	23.1
10	23.1	23.2	23.1	23.2	23.0

Table 4. Overlying Water D.O.Values (mg/L) for ECT Sediments During 10-Day Hyalella Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	8.2	8.4	8.4	8.4	8.3
1	6.6	6.5	6.9	7.0	7.2
2	7.5	6.7	6.7	6.9	7.0
3	8.1	6.9	8.0	8.1	8.0
4	8.1	7.7	7.7	8.2	8.2
5	7.5	6.2	6.8	7.4	7.6
6	7.9	6.9	7.3	7.2	7.7
7	8.1	6.6	7.1	7.4	7.5
8	7.5	7.0	7.0	7.1	7.2
9	7.8	8.0	7.7	7.8	7.8
10	7.3	7.8	7.4	7.3	7.6

Suspend feeding if DO < 2.5 mg/L

Table 5. Overlying Water D.O. Values (mg/L) for ECT Sediments During 10-Day Chironomus Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	8.2	8.4	8.4	8.4	8.3
1	7.0	6.1	5.8	5.9	6.5
2	6.0	5.2	5.4	5.7	6.0
3	7.4	7.7	7.7	6.7	6.6
4	6.8	6.6	6.6	6.9	6.5
5	7.5	4.0	4.0	4.8	6.3
6	8.0	6.5	5.7	5.7	5.2
7	7.9	6.6	6.7	6.7	7.5
8	8.0	6.7	6.7	6.6	6.8
9	8.0	8.0	8.0	7.8	7.8
10	7.8	7.6	7.5	7.8	7.1

Suspend feeding if DO < 2.5 mg/L

Table 6. Overlying Water pH Values for ECT Sediments During 10-Day *Hyalella* Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	7.53	7.72	7.77	7.82	7.96
10	7.58	7.69	7.73	7.61	7.63

Table 7. **Overlying Water pH Values for ECT Sediments During 10-Day *Chironomus* Exposures**

Day	West Bearskin	LV01	LV02	SL02	SL03
0	2.53	7.72	7.77	7.62	7.96
10	7.68	7.75	7.68	7.61	7.81

Table 8. Overlying Water Cond. Values (umhos/cm) for ECT Sediments During 10-Day Hyalella Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	126	212	238	402	218
10	129	232	254	236	215

Table 9. Overlying Water Cond. Values (umhos/cm) for ECT Sediments During 10-Day Chironomus Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	126	212	238	402	218
10	130	236	248	231	220

Table 10. Overlying Water Alkalinity Values (mg/L) for ECT Sediments During 10-Day *Hyalella* Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	18	108	164	188	130
10	28	110	150	192	100

Table 11. Overlying Water Alkalinity Values (mg/L) for ECT Sediments During 10-Day *Chironomus* Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	~~84~~ 18	~~120~~ 108	~~152~~ 164	~~166~~ 188	~~118~~ 130 Room 4/4
10	42	112	160	168	120

Table 12. Overlying Water Hardness Values (mg/L) for ECT Sediments During 10-Day *Hyalella* Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	84	120	152	166	118
10	42	114	160	146	128

Table 13. Overlying Water Hardness Values (mg/L) for ECT Sediments During 10-Day *Chironomus* Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	84	120	152	160	118
10	40	120	158	150	130

Table 14. Overlying Water Ammonia Values (mg/L) for ECT Sediments During 10-Day *Hyalella* Exposures

Day	West Bearskin	LV01	LV02	SL02	SL03
0	<1	2.0	3.7	3.6	2.1
10	<1	<1	1.3	<1	<1

Table 15. **Overlying Water Ammonia Values (mg/L) for ECT Sediments During 10-Day *Chironomus* Exposures**

Day	West Bearskin	LV01	LV02	SL02	SL03
0	<1	2.0	3.2	3.4	2.1
10	<1	1.1	1.2	<1	<1

Chironomus tentans 10-day Survival and Growth Data

Site ID # West Bearskin

Rep	# Organisms			Ashed Pan Wt. (g)	Pan + Dried Org. Wt. (g)	Pan + Ashed Org. Wt. (g)
	Alive	Dead	Weighed			
A	10	0	10	1.27746	1.28684	
B	10	0	10	1.26731	1.27654	
C	10	0	10	1.27202	1.28340	
D	10	0	10	1.27541	1.28579	
E	10	0	10	1.27352	1.28464	
F	9	1	9	1.27636	1.28742	
G	10	0	10	1.26498	1.27684	
H	9	1	9	1.26141	1.27205	

Hyalella azteca 10-day Survival

Site ID # West Bearskin

Rep	# Organisms	
	Alive	Dead
A	10	0
B	9	1
C	10	0
D	10	0
E	10	0
F	10	0
G	9	1
H	10	0

Chironomus tentans 10-day Survival and Growth Data

Site ID # LV01

Rep	# Organisms			Ashed Pan Wt. (g)	Pan + Dried Org. Wt. (g)	Pan + Ashed Org. Wt. (g)
	Alive	Dead	Weighed			
A	9	1	9	1.27312	1.28789	
B	9	1	9	1.27349	1.28618	
C	10	0	10	1.25827	1.26955	
D	6	4	6	1.25433	1.26401	
E	10	0	10	1.26668	1.28048	
F	9	1	9	1.26616	1.28061	
G	8	2	0	1.25057	1.26307	
H	10	0	10	1.27477	~~1.28~~ CJA 11/14/09 1.29008	

Hyalella azteca 10-day Survival

Site ID # LV01

Rep	# Organisms	
	Alive	Dead
A	8	2
B	10	0
C	9	1
D	10	0
E	10	0
F	10	0
G	10	0
H	8	2

Chironomus tentans **10-day Survival and Growth Data**

Site ID # LV02

Rep	# Organisms			Ashed Pan Wt. (g)	Pan + Dried Org. Wt. (g)	Pan + Ashed Org. Wt. (g)
	Alive	Dead	Weighed			
A	8	2	8	1.27474	1.29054	
B	10	0	10	1.25410	1.26784	
C	10	0	10	1.26060	1.27435	
D	9	1	9	1.27019	1.28453	
E	~~9~~ 10	6	~~9~~ 10	1.26574	1.28214	
F	9	1	9	1.25975	1.26958	
G	10	0	10	1.27639	1.29235	
H*	5	5	5	1.25879	1.26291	

* Large vegetation present that may have disturbed sediment/water interface.

Hyalella azteca **10-day Survival**

Site ID # LV02

Rep	# Organisms	
	Alive	Dead
A	9	1
B	7	3
C	9	1
D	10	0
E	10	0
F	9	1
G	10	0
H	10	0

Chironomus tentans 10-day Survival and Growth Data

Site ID # SL02

Rep	# Organisms			Ashed Pan Wt. (g)	Pan + Dried Org. Wt. (g)	Pan + Ashed Org. Wt. (g)
	Alive	Dead	Weighed			
A	10	0	10	1.26257	1.28093	
B	10	0	10	1.27587	1.29071	
C	10	0	10	1.27084	1.28997	
D	10	0	10	1.27218	1.28523	
E	9	1	9	1.26871	1.28200	
F	10	0	10	1.26142	1.27701	
G	10	0	10	1.25806	1.27483	
H	10	0	10	1.27280	1.29099	

Hyalella azteca 10-day Survival

Site ID # SL02

Rep	# Organisms	
	Alive	Dead
A	10	0
B	9	1
C	9	1
D	8	2
E	10	0
F	9	1
G	10	0
H	10	0

Chironomus tentans 10-day Survival and Growth Data

Site ID # SL03

Rep	# Organisms			Ashed Pan Wt. (g)	Pan + Dried Org. Wt. (g)	Pan + Ashed Org. Wt. (g)
	Alive	Dead	Weighed			
A	10	0	10	1.27553	1.29705	
B	10	0	10	1.25807	1.28002	
C	10	0	10	1.26229	1.28261	
D	9	1	9	1.26551	1.28497	
E	9	1	9	1.26296	1.28759	
F	8	2	8	1.25892	1.27870	
G	9	1	9	1.25887	1.27924	
H	9	1	9	1.25498	1.27709	

Hyalella azteca 10-day Survival

Site ID # SL03

Rep	# Organisms	
	Alive	Dead
A	9	1
B	8	2
C	10	0
D	10	0
E	10	0
F	10	0
G	10	0
H	9	1

WBS

	ASHED PAN WEIGHT	ASHED PAN WEIGHT + ASHED CT
A	1.25060	1.25306
B	1.26558	1.26799
C	1.25795	1.26084
D	1.26067	1.26339
E	1.25779	1.26025
F	1.25453	1.25721
G	1.26418	1.26694
H	1.24802	1.25060

LV01

	ASHED PAN WEIGHT	ASHED PAN WEIGHT + ASHED CT
A	1.25498	1.25800
B	1.26783	1.27035
C	1.26801	1.27007
D	1.26508	1.26707
E	1.24426	1.24688
F	1.25890	1.26214
G	1.29723	1.29943
H	1.26021	1.26325

LV02

	ASHED PAN WEIGHT	ASHED PAN WEIGHT + ASHED CT
A	1.26846	1.27269
B	1.25596	1.25916
C	1.25907	1.26250
D	1.25487	1.25880
E	1.26920	1.27383
F	1.29280	1.29714
G	1.24753	1.25191
H	1.26053	1.26096

SLO2

	ASHED PAN WEIGHT	ASHED PAN WEIGHT + ASHED CT
A	1.26000	1.26642
B	1.25670	1.26308
C	1.24821	1.25545
D	~~1.2548~~ 1.25841	1.26313
E	1.26313	1.26798
F	1.26562	1.27068
G	1.28082	1.28636
H	1.25698	1.26400

SL03

	ASHED PAN WEIGHT	ASHED PAN WEIGHT + ASHED CT
A	1.25767	1.26840
B	1.26877	1.27915
C	1.25634	1.26519
D	1.25359	1.26214
E	1.26154	1.27607
F	1.25784	1.26678
G	1.25699	1.26684
H	1.25485	1.26215

APPENDIX C

Statistical Analyses

Title: ECT Hyalella Survival
File: ECTHA Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.5212
W = 0.8433

Critical W = 0.9190 (alpha = 0.01 , N = 40)
W = 0.9400 (alpha = 0.05 , N = 40)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normality and should not be performed with this data as is.

Title: ECT Hyalella Survival
File: ECTHA Transform: ARC SINE(SQUARE ROOT(Y))

Levene's Test for Homogeneity of Variance

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	0.0252	0.0063	0.6313
Within (Error)	35	0.3498	0.0100	
Total	39	0.3750		

(p-value = 0.6435)

Critical F = 3.9082 (alpha = 0.01, df = 4,35)
= 2.6415 (alpha = 0.05, df = 4,35)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.01)

Title: ECT Hyalella Survival
File: ECTHA Transform: ARC SINE(SQUARE ROOT(Y))

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	West Bearskin	1.3713				
2	LV-01	1.3154	62.00	47.00	8.00	
3	LV-02	1.2983	59.00	47.00	8.00	
4	SL-02	1.3128	59.00	47.00	8.00	
5	SL-03	1.3332	63.00	47.00	8.00	

Critical values are 1 tailed (k = 4)

Title: ECT Chironomus Survival
File: ECTCT Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.6925
W = 0.8704

Critical W = 0.9190 (alpha = 0.01 , N = 40)
W = 0.9400 (alpha = 0.05 , N = 40)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normality and should not be performed with this data as is.

Title: ECT Chironomus Survival
File: ECTCT Transform: ARC SINE(SQUARE ROOT(Y))

Levene's Test for Homogeneity of Variance

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	0.0822	0.0206	1.8628
Within (Error)	35	0.3863	0.0110	
Total	39	0.4686		

(p-value = 0.1390)

Critical F = 3.9082 (alpha = 0.01, df = 4,35)
= 2.6415 (alpha = 0.05, df = 4,35)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.01)

Title: ECT Chironomus Survival
File: ECTCT Transform: ARC SINE(SQUARE ROOT(Y))

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	West Bearskin	1.3713				
2	LV-01	1.2471	54.00	47.00	8.00	
3	LV-02	1.2345	54.00	47.00	8.00	
4	SL-02	1.3916	72.00	47.00	8.00	
5	SL-03	1.2924	55.00	47.00	8.00	

Critical values are 1 tailed (k = 4)

APPENDIX D

Post-Carbon Water Analysis

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

Lab Project Number: 1080640
Client Project ID: QA/QC #098

Lab Sample No: 105048185 Project Sample Number: 1080640-001 Date Collected: 11/03/03 11:00
Client Sample ID: MILLIPORE Matrix: Water Date Received: 11/04/03 10:00

Parameters	Results	Units	Report Limit	Analyzed	By	CAS No.	Qual	RegLmt
Metals								
Metals, Trace ICP	Prep/Method: EPA 3010 / EPA 6010							
Arsenic	ND	ug/l	10.0	11/13/03 17:54	VAF	7440-38-2		
Barium	ND	ug/l	10.0	11/13/03 17:54	VAF	7440-39-3		
Cadmium	ND	ug/l	1.00	11/13/03 17:54	VAF	7440-43-9		
Chromium	ND	ug/l	10.0	11/13/03 17:54	VAF	7440-47-3		
Lead	ND	ug/l	3.00	11/13/03 17:54	VAF	7439-92-1		
Selenium	ND	ug/l	15.0	11/13/03 17:54	VAF	7782-49-2		
Silver	ND	ug/l	10.0	11/13/03 17:54	VAF	7440-22-4		
Date Digested	11/04/03			11/04/03				
Mercury, CVAAS	Method: EPA 7470							
Mercury	ND	ug/l	0.200	11/17/03	TEM	7439-97-6		
Wet Chemistry								
Total Suspended Solids	Method: EPA 160.2							
Total Suspended Solids	ND	mg/l	10.0	11/07/03	JDL			
Cyanide, Total, Water	Method: EPA 335.2							
Cyanide	ND	mg/l	0.0100	11/18/03	AGBM	57-12-5	1	
Fluoride, Soluble	Method: EPA 340.2							
Fluoride	ND	mg/l	0.100	11/05/03	LSB	16984-48-8		
Total Organic Carbon	Method: EPA 415.1							
Total Organic Carbon	ND	mg/l	1.0	11/18/03	VAF	7440-44-0		
GC Semivolatiles								
Organochlorine Pesticides	Prep/Method: EPA 3510 / EPA 8081							
alpha-BHC	ND	ug/l	0.052	11/12/03 06:29	YU1	319-84-6		
beta-BHC	ND	ug/l	0.052	11/12/03 06:29	YU1	319-85-7		
delta-BHC	ND	ug/l	0.052	11/12/03 06:29	YU1	319-86-8		
gamma-BHC (Lindane)	ND	ug/l	0.052	11/12/03 06:29	YU1	58-89-9		
Heptachlor	ND	ug/l	0.052	11/12/03 06:29	YU1	76-44-8		
Aldrin	ND	ug/l	0.052	11/12/03 06:29	YU1	309-00-2		
Heptachlor epoxide	ND	ug/l	0.052	11/12/03 06:29	YU1	1024-57-3		
Endosulfan I	ND	ug/l	0.052	11/12/03 06:29	YU1	959-98-8		
Dieldrin	ND	ug/l	0.10	11/12/03 06:29	YU1	60-57-1		
4,4'-DDE	ND	ug/l	0.10	11/12/03 06:29	YU1	72-55-9		

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

Lab Project Number: 1080640
Client Project ID: QA/QC #098

Lab Sample No: 105048185 Project Sample Number: 1080640-001 Date Collected: 11/03/03 11:00
Client Sample ID: MILLIPORE Matrix: Water Date Received: 11/04/03 10:00

Parameters	Results	Units	Report Limit	Analyzed	By	CAS No.	Qual	RegLmt
Endrin	ND	ug/l	0.10	11/12/03 06:29	YU1	72-20-8		
Endosulfan II	ND	ug/l	0.10	11/12/03 06:29	YU1	33213-65-9		
4,4'-DDD	ND	ug/l	0.10	11/12/03 06:29	YU1	72-54-8		
Endosulfan sulfate	ND	ug/l	0.10	11/12/03 06:29	YU1	1031-07-8		
4,4'-DDT	ND	ug/l	0.10	11/12/03 06:29	YU1	50-29-3		
Methoxychlor	ND	ug/l	0.52	11/12/03 06:29	YU1	72-43-5		
Endrin ketone	ND	ug/l	0.10	11/12/03 06:29	YU1	53494-70-5		
Endrin aldehyde	ND	ug/l	0.10	11/12/03 06:29	YU1	7421-93-4		
Chlordane (Technical)	ND	ug/l	2.1	11/12/03 06:29	YU1	57-74-9		
Toxaphene	ND	ug/l	5.2	11/12/03 06:29	YU1	8001-35-2		
gamma-Chlordane	ND	ug/l	0.052	11/12/03 06:29	YU1	5103-74-2		
alpha-Chlordane	ND	ug/l	0.052	11/12/03 06:29	YU1	5103-71-9		
Decachlorobiphenyl (S)	90	%		11/12/03 06:29	YU1	2051-24-3		
Tetrachloro-m-xylene (S)	89	%		11/12/03 06:29	YU1	877-09-8		
Date Extracted	11/06/03			11/06/03				

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Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

Lab Project Number: 1080640
Client Project ID: QA/QC #098

Lab Sample No: 105048193 Project Sample Number: 1080640-002 Date Collected: 11/03/03 11:00
Client Sample ID: POST-CARBON Matrix: Water Date Received: 11/04/03 10:00

Parameters	Results	Units	Report Limit	Analyzed	By	CAS No.	Qual	RegLmt
Metals								
Metals, Trace ICP	Prep/Method: EPA 3010 / EPA 6010							
Arsenic	ND	ug/l	10.0	11/13/03 18:00	VAF	7440-38-2		
Barium	ND	ug/l	10.0	11/13/03 18:00	VAF	7440-39-3		
Cadmium	ND	ug/l	1.00	11/13/03 18:00	VAF	7440-43-9		
Chromium	ND	ug/l	10.0	11/13/03 18:00	VAF	7440-47-3		
Lead	ND	ug/l	3.00	11/13/03 18:00	VAF	7439-92-1		
Selenium	ND	ug/l	15.0	11/13/03 18:00	VAF	7782-49-2		
Silver	ND	ug/l	10.0	11/13/03 18:00	VAF	7440-22-4		
Date Digested	11/04/03			11/04/03				
Mercury, CVAAS	Method: EPA 7470							
Mercury	ND	ug/l	0.200	11/17/03	TEM	7439-97-6		
Wet Chemistry								
Total Suspended Solids	Method: EPA 160.2							
Total Suspended Solids	ND	mg/l	10.0	11/07/03	JDL			
Cyanide, Total, Water	Method: EPA 335.2							
Cyanide	ND	mg/l	0.0100	11/18/03	AGBM	57-12-5	1	
Fluoride, Soluble	Method: EPA 340.2							
Fluoride	1.08	mg/l	0.100	11/05/03	LSB	16984-48-8		
Total Organic Carbon	Method: EPA 415.1							
Total Organic Carbon	ND	mg/l	1.0	11/18/03	VAF	7440-44-0		
GC Semivolatiles								
Organochlorine Pesticides	Prep/Method: EPA 3510 / EPA 8081							
alpha-BHC	ND	ug/l	0.052	11/12/03 06:54	YU1	319-84-6		
beta-BHC	ND	ug/l	0.052	11/12/03 06:54	YU1	319-85-7		
delta-BHC	ND	ug/l	0.052	11/12/03 06:54	YU1	319-86-8		
gamma-BHC (Lindane)	ND	ug/l	0.052	11/12/03 06:54	YU1	58-89-9		
Heptachlor	ND	ug/l	0.052	11/12/03 06:54	YU1	76-44-8		
Aldrin	ND	ug/l	0.052	11/12/03 06:54	YU1	309-00-2		
Heptachlor epoxide	ND	ug/l	0.052	11/12/03 06:54	YU1	1024-57-3		
Endosulfan I	ND	ug/l	0.052	11/12/03 06:54	YU1	959-98-8		
Dieldrin	ND	ug/l	0.10	11/12/03 06:54	YU1	60-57-1		
4,4'-DDE	ND	ug/l	0.10	11/12/03 06:54	YU1	72-55-9		

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Phone: 612.607.1700
Fax: 612.607.6444

Lab Project Number: 1080640
Client Project ID: QA/QC #098

Lab Sample No: 105048193 Project Sample Number: 1080640-002 Date Collected: 11/03/03 11:00
Client Sample ID: POST-CARBON Matrix: Water Date Received: 11/04/03 10:00

Parameters	Results	Units	Report Limit	Analyzed	By	CAS No.	Qual	RegLmt
Endrin	ND	ug/l	0.10	11/12/03 06:54	YU1	72-20-8		
Endosulfan II	ND	ug/l	0.10	11/12/03 06:54	YU1	33213-65-9		
4,4'-DDD	ND	ug/l	0.10	11/12/03 06:54	YU1	72-54-8		
Endosulfan sulfate	ND	ug/l	0.10	11/12/03 06:54	YU1	1031-07-8		
4,4'-DDT	ND	ug/l	0.10	11/12/03 06:54	YU1	50-29-3		
Methoxychlor	ND	ug/l	0.52	11/12/03 06:54	YU1	72-43-5		
Endrin ketone	ND	ug/l	0.10	11/12/03 06:54	YU1	53494-70-5		
Endrin aldehyde	ND	ug/l	0.10	11/12/03 06:54	YU1	7421-93-4		
Chlordane (Technical)	ND	ug/l	2.1	11/12/03 06:54	YU1	57-74-9		
Toxaphene	ND	ug/l	5.2	11/12/03 06:54	YU1	8001-35-2		
gamma-Chlordane	ND	ug/l	0.052	11/12/03 06:54	YU1	5103-74-2		
alpha-Chlordane	ND	ug/l	0.052	11/12/03 06:54	YU1	5103-71-9		
Decachlorobiphenyl (S)	90	%		11/12/03 06:54	YU1	2051-24-3		
Tetrachloro-m-xylene (S)	86	%		11/12/03 06:54	YU1	877-09-8		
Date Extracted	11/06/03			11/06/03				

REPORT OF LABORATORY ANALYSIS

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Lab Project Number: 1080640
Client Project ID: QA/QC #098

PARAMETER FOOTNOTES

ND	Not detected at or above adjusted reporting limit
NC	Not Calculable
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit
MDL	Adjusted Method Detection Limit
(S)	Surrogate
[1]	This sample was prepared within hold time, 11/14.

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 99606 — Analysis Method: EPA 8081
QC Batch Method: EPA 3510 — Analysis Description: Organochlorine Pesticides
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105059216
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
alpha-BHC	ug/l	ND	0.050	
beta-BHC	ug/l	ND	0.050	
delta-BHC	ug/l	ND	0.050	
gamma-BHC (Lindane)	ug/l	ND	0.050	
Heptachlor	ug/l	ND	0.050	
Aldrin	ug/l	ND	0.050	
Heptachlor epoxide	ug/l	ND	0.050	
Endosulfan I	ug/l	ND	0.050	
Dieldrin	ug/l	ND	0.10	
4,4'-DDE	ug/l	ND	0.10	
Endrin	ug/l	ND	0.10	
Endosulfan II	ug/l	ND	0.10	
4,4'-DDD	ug/l	ND	0.10	
Endosulfan sulfate	ug/l	ND	0.10	
4,4'-DDT	ug/l	ND	0.10	
Methoxychlor	ug/l	ND	0.50	
Endrin ketone	ug/l	ND	0.10	
Endrin aldehyde	ug/l	ND	0.10	
Chlordane (Technical)	ug/l	ND	2.0	
Toxaphene	ug/l	ND	5.0	
gamma-Chlordane	ug/l	ND	0.050	
alpha-Chlordane	ug/l	ND	0.050	
Decachlorobiphenyl (S)	%	63		
Tetrachloro-m-xylene (S)	%	73		

LABORATORY CONTROL SAMPLE: 105059224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	Footnotes
alpha-BHC	ug/l	1.500	1.465	98	

Date: 11/19/03

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

LABORATORY CONTROL SAMPLE: 105059224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	Footnotes
beta-BHC	ug/l	1.500	1.353	90	
delta-BHC	ug/l	1.500	1.042	70	
gamma-BHC (Lindane)	ug/l	1.500	1.482	99	
Heptachlor	ug/l	1.500	1.413	94	
Aldrin	ug/l	1.500	1.379	92	
Heptachlor epoxide	ug/l	1.500	1.395	93	
Endosulfan I	ug/l	1.500	1.407	94	
Dieldrin	ug/l	1.500	1.487	99	
4,4'-DDE	ug/l	1.500	1.456	97	
Endrin	ug/l	1.500	1.543	103	
Endosulfan II	ug/l	1.500	1.385	92	
4,4'-DDD	ug/l	1.500	1.498	100	
Endosulfan sulfate	ug/l	1.500	1.342	90	
4,4'-DDT	ug/l	1.500	1.471	98	
Methoxychlor	ug/l	1.500	1.665	111	
Endrin ketone	ug/l	1.500	1.441	96	
Endrin aldehyde	ug/l	1.500	1.560	104	
gamma-Chlordane	ug/l	1.500	1.407	94	
alpha-Chlordane	ug/l	1.500	1.414	94	
Decachlorobiphenyl (S)				88	
Tetrachloro-m-xylene (S)				90	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 100092 — Analysis Method: EPA 7470
QC Batch Method: EPA 7470 — Analysis Description: Mercury, CVAAS
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105094973
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
Mercury	ug/l	ND	0.200	

LABORATORY CONTROL SAMPLE: 105094981

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	Footnotes
Mercury	ug/l	5.000	4.984	100	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 105094999 105095004

Parameter	Units	105048185 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	RPD	Footnotes
Mercury	ug/l	0.07700	5.000	4.962	4.909	98	97	1	

SAMPLE DUPLICATE: 105095012

Parameter	Units	105048193 Result	DUP Result	RPD	Footnotes
Mercury	ug/l	ND	ND	NC	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 99461 — Analysis Method: EPA 6010
QC Batch Method: EPA 3010 — Analysis Description: Metals, Trace ICP
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105049175
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
Chromium	ug/l	ND	10.0	
Lead	ug/l	ND	3.00	

LABORATORY CONTROL SAMPLE: 105049183

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	Footnotes
Arsenic	ug/l	1000.00	1039	104	
Barium	ug/l	1000.00	1011	101	
Cadmium	ug/l	1000.00	1028	103	
Chromium	ug/l	1000.00	1037	104	
Lead	ug/l	1000.00	1021	102	
Selenium	ug/l	1000.00	1079	108	
Silver	ug/l	1000.00	1045	105	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 105049191 105049209

Parameter	Units	105040281 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	RPD	Footnotes
Arsenic	ug/l	0	1000.00	1101	1134	110	113	3	
Barium	ug/l	60.83	1000.00	1078	1093	102	103	1	
Cadmium	ug/l	0.08998	1000.00	1026	1042	103	104	1	
Chromium	ug/l	0	1000.00	1035	1050	104	105	1	
Lead	ug/l	0	1000.00	968.6	982.5	97	98	1	
Selenium	ug/l	10.01	1000.00	1107	1102	110	109	0	
Silver	ug/l	2.321	1000.00	1099	1119	110	112	2	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

SAMPLE DUPLICATE: 105049217

Parameter	Units	105040331 Result	DUP Result	RPD	Footnotes
Chromium	ug/l	52.70	52.60	0	
Lead	ug/l	96.00	99.70	4	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 99405 Analysis Method: EPA 340.2
QC Batch Method: EPA 340.2 Analysis Description: Fluoride, Soluble
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105045405
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
Fluoride	mg/l	ND	0.100	

LABORATORY CONTROL SAMPLE & LCSD: 105045413 105045421

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	RPD	Footnotes
Fluoride	mg/l	1.000	0.9560	0.9630	96	96	1	

MATRIX SPIKE: 105045447

Parameter	Units	105043939 Result	Spike Conc.	MS Result	MS % Rec	Footnotes
Fluoride	mg/l	1.140	10.00	9.630	85	

SAMPLE DUPLICATE: 105045439

Parameter	Units	105043905 Result	DUP Result	RPD	Footnotes
Fluoride	mg/l	ND	ND	NC	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 99638 Analysis Method: EPA 160.2
QC Batch Method: EPA 160.2 Analysis Description: Total Suspended Solids
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105063358
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
Total Suspended Solids	mg/l	ND	10.0	

LABORATORY CONTROL SAMPLE: 105063366

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	Footnotes
Total Suspended Solids	mg/l	100.00	95.00	95	

SAMPLE DUPLICATE: 105063374

Parameter	Units	105037873 Result	DUP Result	RPD	Footnotes
Total Suspended Solids	mg/l	ND	ND	NC	

SAMPLE DUPLICATE: 105063689

Parameter	Units	105045777 Result	DUP Result	RPD	Footnotes
Total Suspended Solids	mg/l	ND	ND	NC	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 99872 Analysis Method: EPA 335.2
QC Batch Method: EPA 335.2 Analysis Description: Cyanide, Total, Water
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105079099
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
Cyanide	mg/l	ND	0.0100	

LABORATORY CONTROL SAMPLE: 105079107

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	Footnotes
Cyanide	mg/l	0.0800	0.0818	102	

MATRIX SPIKE: 105079131

Parameter	Units	105069108 Result	Spike Conc.	MS Result	MS % Rec	Footnotes
Cyanide	mg/l	0.2458	0.0800	0.2958	62	1

SAMPLE DUPLICATE: 105079115

Parameter	Units	105047997 Result	DUP Result	RPD	Footnotes
Cyanide	mg/l	0.02690	ND	NC	2,3

SAMPLE DUPLICATE: 105079123

Parameter	Units	105052211 Result	DUP Result	RPD	Footnotes
Cyanide	mg/l	ND	ND	NC	

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QUALITY CONTROL DATA

Lab Project Number: 1080640
Client Project ID: QA/QC #098

QC Batch: 99683 Analysis Method: EPA 415.1
QC Batch Method: SM 5310C Analysis Description: Total Organic Carbon
Associated Lab Samples: 105048185 105048193

METHOD BLANK: 105070759
Associated Lab Samples: 105048185 105048193

Parameter	Units	Blank Result	Reporting Limit	Footnotes
Total Organic Carbon	mg/l	ND	1.0	

LABORATORY CONTROL SAMPLE & LCSD: 105070767 105070775

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	RPD	Footnotes
Total Organic Carbon	mg/l	5.000	4.997	4.504	100	90	10	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 105105639 105105647

Parameter	Units	105052682 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	RPD	Footnotes
Total Organic Carbon	mg/l	0.9503	2.000	2.835	2.870	94	96	1	

SAMPLE DUPLICATE: 105070809

Parameter	Units	105048185 Result	DUP Result	RPD	Footnotes
Total Organic Carbon	mg/l	ND	ND	NC	

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Lab Project Number: 1080640
Client Project ID: QA/QC #098

QUALITY CONTROL DATA PARAMETER FOOTNOTES

Consistent with EPA guidelines, unrounded concentrations are displayed and have been used to calculate % Rec and RPD values.

LCS(D)	Laboratory Control Sample (Duplicate)
MS(D)	Matrix Spike (Duplicate)
DUP	Sample Duplicate
ND	Not detected at or above adjusted reporting limit
NC	Not Calculable
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit
MDL	Adjusted Method Detection Limit
RPD	Relative Percent Difference
(S)	Surrogate
[1]	The spike recovery was outside of acceptance limits.
[2]	Duplicate analysis is not within control limits.
[3]	This sample was prepared within hold time, 11/14.

Appendix D

Oakland County Lakes sediment field notes

12/13/03
Sylvan Lake
Onsite at 8:15am MMM, AD, JE
30°, sunny, calm, no wind
Ice conditions: couldn't use public boat launch, ice 1.5-2 inches thick. Used launch site @ Park. Overall ice thickness approximately .5-1.5 inches thick

SL01 3.6-foot water depth

-1	11:00	head valve at top of sediment
-2	11:32	head valve at top of sediment
-3	11:45	4ft into sediment
-4	12:10	top of liner to water level…approx. 1.4 ft into sediment
	11:10	7 ponar grabs to fill bucket

SL02 2.5 foot water depth

-1	12:35	18 inches into sediment
-2	12:37	24 inches into sediment
-3	12:45	24 inches into sediment
	12:50	9 ponar grabs to fill bucket

SL03 2.5 foot water depth

	13:30	5 ponar grabs to fill bucket
-1	13:40	20 inches into sediment
-2	13:50	24 inches into sediment
-3	13:55	24 inches into sediment

12/15/03
Loon Lake
Onsite at 8:30am MMM, JE, JFK
Ice conditions: Boat ramp had 1-1.5 inches of ice, but broke through using poles. Majority of lake was open water. 10-15 feet along the shoreline was frozen.

LL01 2.5-foot water depth

-1	10:00	
-2	10:03	
-3	10:05	
-4	10:08	
	10:15	4 ponar grabs to fill bucket

LL02 2.5-foot water depth

-1	10:30	
-2	10:32	
-3	10:37	
-4	10:42	
	10:50	10 ponar grabs to fill bucket

LL03 2.5-foot water depth

-1	11:07	
-2	11:10	
-3	11:15	
-4	11:20	
	11:25	6 ponar grabs to fill bucket

12/22/03
Lake Orion
Onsite at 12:00pm MMM, JE, JFK
40° overcast, wind approx. 8mph
Ice conditions: DNR boat launch was iced over; used village ramp located at the end of Lake Drive. Main portion of the lake was open water, but the bays/coves were ice 2-6 inches thick.
No GPS in field, marked locations on field map.

LO01 water too deep @ outlet due to dam, taken NE of outlet, 15' offshore

-1	13:45	
-2	13:50	
-3	13:53	
	13:58	5 ponar grabs to fill bucket

LO02 taken on south side of inlet cove due to ice and water depth

-1	14:40	
-2	14:42	
-3	14:50	
	14:55	6 ponar grabs to fill bucket

LO03 taken on north side of inlet cove due to ice and water depth

-1	15:22	
-2	15:40	
-3	15:45	
-4	16:00	
	16:15	9 ponar grabs to fill bucket

01/22/04
Lakeville Lake
Onsite at 10:00am JFK, JE
10 - 20°F partly cloudy, windy
Ice conditions: Lakeville Lake was completely covered with ice; therefore, an airboat was used during the study. No GPS in field, marked locations on field map.

LV01 taken on south side of lake in outlet cove

-1	12:35	
-2	12:39	
-3	12:43	
	12:48	7 ponar grabs to fill bucket

LV02 taken on north side of lake northern section of inlet cove

-1	13:30	
-2	13:33	
-3	13:35	
-4	13:38	
	13:41	5 ponar grabs to fill bucket

LV03 taken south of LV02 in inlet cove

-1	13:47	
-2	13:50	
-3	13:54	
-4	13:59	
	14:02	6 ponar grabs to fill bucket

Field notes taken during sample compositing.

Site ID	Time	Recovery (in)	Depth (in)	Description
SL01-1	11:00	37	0 – 16	Dark grey med sand w/shells
			16 – 37	Lt grey silt
SL01-2	11:32	46	0 – 27	Dark gray med sand
			27 – 46	Med grey silt w/sand
SL01-3	11:45	35	0 – 15	Dark brown/grey med sand
			15 – 35	Med grey silt
SL01-4	12:10	15	0 – 15	Brown med sand
SL02-1	12:35	14	0 - 14	Dark brown to grey med sand w/silt and occasional gravel
SL02-2	12:37	21	0 - 21	
SL02-3	12:45	15	0 - 15	
SL03-1	13:40	24	0 – 24	Dark brown to grey med/fine sand
SL03-2	13:50	27	0 – 27	
SL03-3	13:55	29	0 – 29	
LL01-1		3	0 – 3	50% Peat, w/ 50% black silt
LL01-2		19	0 – 19	
LL01-3		19	0 – 19	
LL01-4		16	0 – 16	
LL02-1	10:30	18	0 – 18	50% Peat, w/ 50% black silt
LL02-2	10:32	17	0 – 17	
LL02-3	10:37	17	0 – 17	
LL02-4	10:42	15	0 – 15	
LL03-1	11:07	15	0 – 15	50% Peat, w/ 50% black silt
LL03-2	11:10	14	0 – 14	
LL03-3	11:15	19	0 – 19	
LL03-4	11:20	18	0 – 18	
LO01-1	13:45	16	0 – 7	Dark gray silty sand – fine to coarse grains – some shells & occasional (trace) slate or shale
			7 – 11	Silty fine sand – shells (some) Dark gray olive
			11 – 16	Lt gray silty fine to med sand
LO01-2	13:50	9	0 – 7	Dark gray silty sand – fine to coarse – trace shells
			7 – 9	Silty fine sand – trace shells dark gray olive
LO01-3	13:53	20	0 – 7	Dark gray silty sand – fine to coarse trace shells – trace gravel – ½" diameter
			7 – 12	Silty fine sand – dark gray olive – trace shells
			12 – 20	Lt gray silty sand fine to med.

LO02-1	14:40	6	0 – 6	Dark gray fine to coarse sand – occasional gravel
LO02-2	14:43	12	0 – 6	Dark gray fine to coarse sand
			6 – 10	Fine to medium sand – dark gray
			10 – 12	Gray silty clay
LO02-3	14:50	13	0 – 2	Dark gray silty fine to coarse sand
			2 – 13	Dark gray silty clay
LO03-1	15:22	< 3	N/A	Sample discarded
LO03-2	15:40	4	0 – 4	Dark gray silty sand – fine to coarse – trace gravel/shells
LO03-3	15:45	13	0 – 3	Dark gray silty sand fine to coarse – trace gravel/shells
			3 – 13	Brown clay with fine/med sand
LO03-4	15:55	12	0 – 4	Dark gray silty sand fine to coarse – trace gravel/shells
			4 – 12	Brown clay with fines
LV01-1		5	0 – 5	Fine to coarse sand – black – shells/leaf debris/roots
LV01-2		12	0 – 12	Fine to coarse sand – trace gravel, leaf debris/roots – lower 4" black, upper 8" green/brown
LV01-3		14	0 – 14	
LV02-1		20	0 – 20	Green/brown mucky sediment with plant debris – peat & shells
LV02-2		14	0 – 14	
LV02-3		16	0 – 16	
LV03-1		16	0 – 16	Green/brown mucky sediment with plant debris – peat & shells
LV03-2		12	0 – 12	
LV03-3		15	0 – 15	
LV03-4		18	0 – 18	